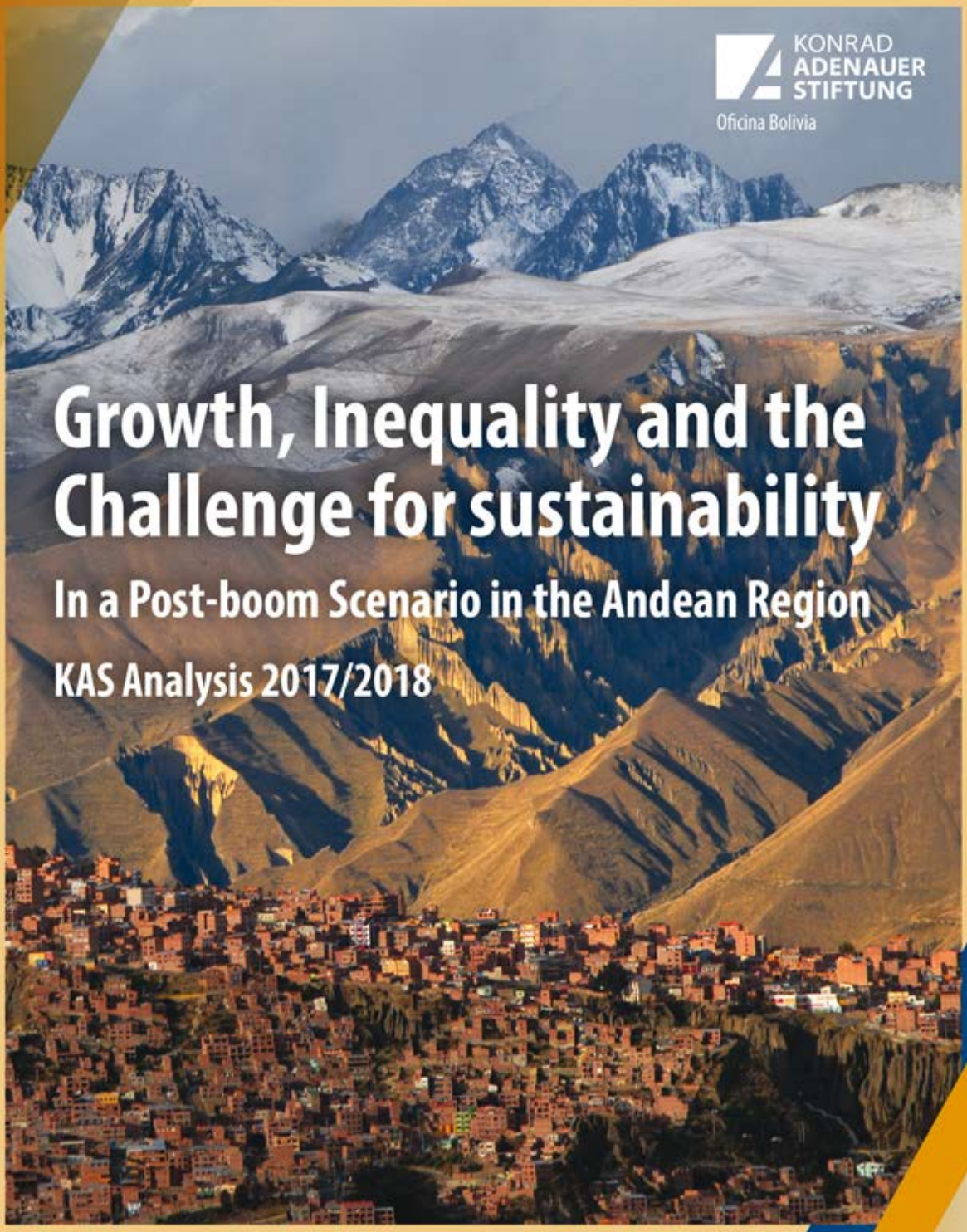

KONRAD ADENAUER STIFTUNG
Oficina Bolivia

Growth, Inequality and the Challenge for sustainability

In a Post-boom Scenario in the Andean Region

KAS Analysis 2017/2018

Freie Universität Berlin

PUCP

trAndeS
Programa de Posgrado en Desarrollo Sostenible y Desigualdades Sociales en la Región Andina

Ministerio Federal de Cooperación Económica y Desarrollo

DAAD

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EDITORIAL COMMITTEE

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Presentation

Freedom, justice and solidarity are the principles towards which the work of the Konrad Adenauer Foundation (KAS) is oriented. The KAS is a political foundation close to the Christian Democratic Union (CDU). As co-founder of the CDU and first German Federal Chancellor Konrad Adenauer (1876-1967) he linked the social-Christian, conservative and liberal traditions. Its name represents the reconstruction of Germany, its settlement in foreign policy, a community of transatlantic values, the vision of the European Union and the orientation towards the Social Market Economy (ESM). His intellectual legacy remains for us as a task and obligation at the same time.

With our European and international work, we strive so that people can live free with freedom and dignity. We contribute to an orientation of values so that Germany can fulfill its growing responsibility in the world. We want to motivate people to participate in this regard, for the construction of the future. Through more than 19 offices in Germany and 80 offices and projects in more than 100 countries we contribute on our own initiative to promote democracy, the rule of law and the social market economy. To consolidate peace and freedom, we support the continuous dialogue on foreign policy and security as well as the exchange between different cultures and religions.

For us, the person is in the center of attention with their unmistakable dignity, their rights and obligations. The person forms the starting point for social justice, democracy in freedom and a sustainable economy. By promoting the exchange and the relationship between people who assume their social responsibility, we develop active networks in the fields of politics, economy and society. Our management on political knowledge improves the perspective of creating a socially fair, ecologically sustainable and economically efficient globalization.

In Bolivia, the Konrad Adenauer Foundation (KAS), completed 51 years of work and in more than half a century, we have supported the strengthening of democracy and the rule of law, but also freedom of expression, inclusion, a culture of peace, the social market economy, the indigenous political participation among others; which are the traditional areas of activity that KAS develops and will continue to develop in Bolivia and Latin America.

In the economic area, the orientation of work is aimed at supporting the theme of the social market economy in general, the economy and public policies which improve the well-being of Latin Americans and Bolivians in particular. We consider that the respect for the dignity of the human being, his right to design his life with responsibility and in function of the freedom of the individual, is the foundation of the social market economy, beyond economic theory; Likewise, the democratic organization of political freedom, respecting the social component, economic and social freedoms, are the foundations in the work agenda of KAS in Latin America. With the aim of supporting this work agenda, since 2008 in Bolivia, "KAS Analysis" has been published, which is an annual publication and the idea of this space for reflection and research is also to generate institutional synergies and establish a dialogue network, to be able to collect analysis and empirical research based on data to understand the Latin American reality. In this issue (KAS Analysis 01 / 2017-18) entitled "Growth, Inequality and the challenges for Sustainability in a post-boom scenario" in the Andean region, we are honored to have the collaboration of the "trAndeS" research program.

The "trAndeS" program was born as a joint initiative between the Freie Universität Berlin (FU Berlin) and the Pontifical Catholic University of Peru (PUCP). "TrAndeS" seeks to create and disseminate scientific knowledge which can contribute to the achievement of the Sustainable Development Goals of the United Nations, throughout the Andean Region. The trAndeS research program is based on the recognition of the close links between sustainable development and the strong social inequalities in the Andean region, in order to comply with the Sustainable Development Goals (SDGs). To fulfill these objectives "trAndeS" includes three areas of work: Postgraduate training, interdisciplinary research and the Transandina Sustainability Network. It is also important to note that through the "trAndeS" network, it was made the call for the research that are part of this issue, and its platform served for the selection of research papers.

In this regard, at the end of 2017 we invited researchers from the Andean region through an open call, in the platform of the trAndeS network, in the social networks and contact institutions of the KAS Bolivia to present research proposals, following the analytical line of the book: Inequality, poverty, social mobility, economic policy, sustainability and environment. The response from the research centers was very diverse and many researchers from the region presented their proposals, from which the following investigations were selected:

Researcher	Research Title	Institutional affiliation
Marco Just Quiles	Persisting Inequalities in Boom Times: Analyzing local public service variations in Bolivia (2001 - 2012)	Freie Universität Berlin (FU Berlin). Alemania
Mercy Orellana Bravo. Rodrigo Mendieta Muñoz. Nelson Tapia Olvera	The multi-dimensional poverty in Ecuador. A spatial analysis	University of Cuenca, Research Group in Regional Economics (GIER), Ecuador
Pablo Evia	Addressing horizontal inequality in Bolivia: what is the role of the fiscal policy?	Rheinische Friedrich-Wilhelms-Universität Bonn. Center for Development Research (ZEF). Alemania
Nelson Chacón. Horacio Valencia	Fighting poverty with efficiency: the new role of social transfers in Bolivia in a less favorable context	Institute of Advanced Studies in Development - INESAD, Bolivia

Researcher	Research Title	Institutional affiliation
Horacio Vera Cossio. Marcelo Gantier Mita	The relationship between natural resources and local human development: Signs of curse or blessing?	Institute of Socio-Economic Research (IISEC) of the Bolivian Catholic University "San Pablo", Bolivia
Laura Alvarez Huwiler	Public policies to attract capital to the mining sector. The case of Works for Taxes	National University of Quilmes, Argentina. CONICET. TrAndeS
Carmen Rosa Marull Maita	Mobility of labor income during the boom and post-boom of commodities: the case of Peru	Freie Universität Berlin, (FU Berlin) Institute of Latin American Studies, Department of Economics and Business, Germany
Julio Humérez Quiroz	Economic Growth, Inequality and Poverty in Bolivia	University Mayor de San Andrés (UMSA). Bolivia
Iván Omar Velásquez-Castellanos. Ludwing Torres Carrasco.	Social Mobility, Poverty and Inequality in a Multiethnic Society. Reconfiguration, Stratification and Change in the Social Levels of Bolivians at Urban and Rural Level (1996-2016)	Konrad Adenauer Foundation (KAS) Bolivia Office. Universidad Mayor de San Andrés (UMSA), Bolivia
Daniel Moreno Morales	Inequality, satisfaction and redistribution. Citizen Perceptions of Inequality and Development in the Andean Region Citizenship	Community of Social Studies and Public Action, Bolivia

The editorial team was composed by Dr. Bettina Schorr who is Director of the TrAndeS Program, of the Freie Universität Berlin (FU Berlin), Dr. Gerardo Hector Damonte Valencia, Associate Professor of the Pontifical Catholic University of Peru (PUCP) and Principal Investigator of the Group of Analysis for Development (GRADE) and Dr. Iván Velásquez-Castellanos, Coordinator in the Bolivia Office of the Konrad Adenauer Foundation (KAS) to whom I extend my gratefulness for the work done.

Lately, in Latin America progress has been registered in terms of development and some indicators of wellbeing such as health, life expectancy and education have shown significant advances, largely explained by the cycle of economic boom due to the boom in the prices of raw materials (minerals, gas, oil, agro-industrial products among others) but on the other hand these advances in terms of development in the Andean region, face challenges towards the future, mainly in terms of quality of life, but especially in the sphere of environmental sustainability as well as economic and social aspect, so it is important to evaluate the region in terms of its sustainability, in this sense this publication aims to serve as an input to understand the Andean problem and hopefully can be of help to researchers, universities and institutions related to public policy decisions with these topics.

La Paz, July 13, 2018

Dr. Georg Dufner
Representative in Bolivia
Konrad Adenauer Foundation (KAS)
Bolivia Office

Introduction of the Editorial Committee

Progress in terms of human development, i.e. The improvement of education, health and economic income indicators has been extremely slow in the countries of the Andean region. However, in the last two decades (since the beginning of the year 2000) the region experienced an economic boom phase resulting from a boom in the prices of raw materials (minerals, gas, oil, agro-industrial products, among others) in the market globally induced by a significant increase in demand from China and other South Asian countries such as India (Bridge, 2004, Bebbington and Bury, 2013).

Contrasting this encouraging development, the countries of the Andean region continue to face enormous challenges in terms of human development, especially when including the environmental, social and economic variable sustainability: (therefore: talking about sustainable development). In addition, given that the prices for some export raw materials decreased considerably in the global market, ending the economic boom of the last decades, the region is confronted with new challenges for sustainability.

The problem described above was the motivation to select some research articles that analyze the Andean region. The articles in this edition focus on the economic and social legacies of the last boom of raw materials in the region, specifically in Bolivia, Ecuador and Peru. In particular, the summons focused on three related questions, with the impact of persistent social inequalities and the current moment of the post-boom phase on the dynamics of poverty and social mobility in the Andean region:

1. How do the dynamics of poverty and social mobility in the region continue to influence the multiple social inequalities?
2. What does the post-boom scenario mean for the economic sustainability of the new Andean middle strata?
3. Economic growth has benefited the poor? And in what way has it influenced to solve social inequalities?

Growth and income inequalities

Economic growth (Table 1) has translated into a significant reduction in the levels of moderate and extreme poverty in the countries of the region, as well as a reduction in the levels of income inequality. In fact, at a global level, Latin America is the only region that registered a decrease in terms of income inequality (World Bank, 2016). According to data from ECLAC (2016), the Gini[1] coefficient that is used to measure income inequality fell between 2008 and 2015 in most countries (see graph 1): they were reduced from 0.63 to 0.45 in Bolivia between 2000 and 2015, from 0.58 to 0.46; in Ecuador, between 1999 and 2015 and from 0.56 to 0.44 in Peru in the same period. Another effect of economic growth has been the increase in social mobility. Significant percentages of the low-income sectors could rise in the context of the extractive boom to middle-income levels, while sectors of the middle classes saw their incomes increase to high levels (Dayton-Johnson, 2015). For example, in Bolivia, an estimated 25 percent of households with low incomes could rise to average income levels (UNDP, 2016).

Table 1
Andean Region – Variation Rate of GDP, 2005 - 2013

Country	2005	2006	2007	2008	2009	2010	2011	2012	2013
Bolivia	4,4	4,8	4,6	6,1	3,4	4,1	5,2	5,2	6,8
Colombia	4,7	6,7	6,9	3,5	1,7	4,0	6,6	4,2	4,7
Ecuador	5,3	4,4	2,2	6,4	0,6	3,5	7,8	5,1	4,5
Peru	6,8	7,7	8,9	9,8	0,9	8,8	6,9	6,3	5,8
Venezuela	10,3	9,9	8,8	5,3	-3,2	-1,5	4,2	5,6	1,3
Latin America and Caribbean Area	4,5	5,6	5,5	4,0	-1,6	5,8	4,3	3,1	2,5

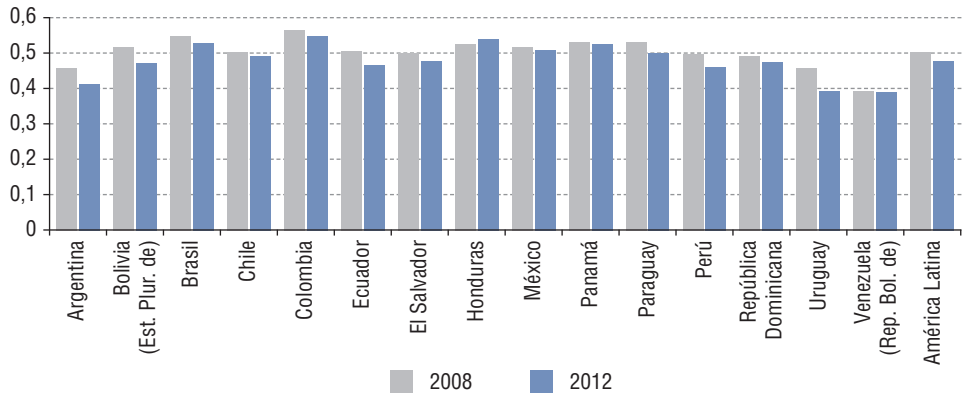
Source: Economic Commission for Latin America and the Caribbean (ECLAC).
Elaboration: Velásquez, Iván.

During this period, there was a relative increase in the income of the lower quintile, higher than the one observed in the top quintile. This situation spread widely to the different sources of household income, mainly to labor income (both for workers who received a salary, and for independent work), pensions and transfers (ECLAC, 2016).

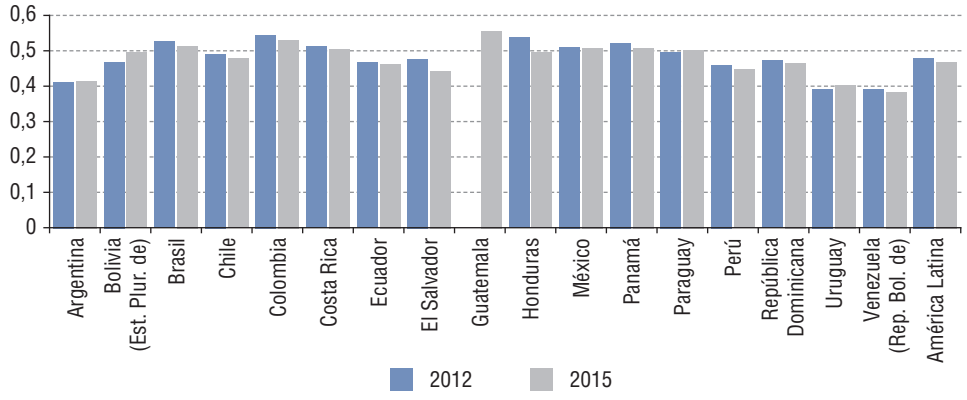
1 The Gini coefficient is a proxy indicator that measures income inequality, takes values between 0 to represent the absence of inequality and 1 to represent the maximum inequality.

Graph 1
Latin America (17 countries): Gini coefficient, around 2008, 2012 and 2015 [a b]

A. Around 2008 and 2012



B. Around 2012 and 2015



Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of the Household Survey Data Bank (BADEHOG).
Elaboration: ECLAC (2016).
Notes:

a. The data correspond to 2008, 2012 and 2015, except in the cases of Argentina (2009, 2012 and 2014), Bolivia (Plurinational State of) (2008, 2011 and 2014), Chile (2009, 2011 and 2015), Colombia (2009, 2012 and 2015), Costa Rica (only 2012 and 2015), El Salvador (2009, 2013 and 2015), Guatemala (2014 only), Honduras (2009, 2013 and 2015), Mexico (2008, 2012 and 2014) and Venezuela (Bolivarian Republic of) (2008, 2012 and 2014).
b. In the Latin American average, there are 15 countrie considered with information on both sub periods. The ones not included in the calculations are Costa Rica, Nicaragua and Guatemala.

For the period between 2008 and 2015 the reduction was less and stagnated in several years, for example in 2015 it remained at levels similar to those observed in 2014. Only in Colombia there were higher levels of inequality, higher than 0, 5 of GINI. While the

economic boom itself explains part of the reduction in inequality, several authors point out that important changes in terms of social policy were also decisive in the development of the inequality index (López-Calvo and Lustig, 2014; Barrientos, 2014). In particular, the implementation of social programs such as the so-called conditional cash transfers (such as Bolsa Familia in Brazil or Bono Juancito Pinto in Bolivia or Oportunidades in Mexico) are considered as programs that have had a great impact in reducing inequality of moderate poverty.

Multidimensional Inequalities and Poverty Reduction

Although indicators of income inequality have improved in recent decades, we should not forget that their levels are still high, keeping Latin America, and the Andean countries, as the most unequal region of the planet[2]. Likewise, social inequalities in Latin America are multidimensional (see Braig et al., 2015): there persists a set of other inequalities based on social categories such as ethnic, gender, citizenship or age. They intermingle with political inequalities that hinder citizen participation or political representation and with unequal access to desired public goods such as health, education, security or a healthy environment, among others. In addition, the Latin American region in general is characterized by immense territorial inequalities (that is, differences in terms of welfare between different territories within a national State) and by its particular insertion in global dynamics characterized by the lack of international power, as well as its participation as a supplier of raw materials in the global market. This results in a series of "global inequalities" (Jelin, Costa and Motta, 2017) that also complicate opportunities for sustainable development in the region because their causes are far from the places where they exert their negative impact. Furthermore, to solve them would require the political will of several asymmetric actors, as well as considerable and expensive international coordination (Schorr, 2018).

Inequalities based on social categories and territorial inequalities tend to intermingle and reinforce each other: In Bolivia, Ecuador and Peru, the highest density of indigenous population in the Americas is concentrated, particularly in rural areas, where they represent 77 percent of the population in Bolivia and 14 percent in Ecuador. As in the rest of the world, an indigenous person is more likely to be poor and lack basic public services. Likewise, rural areas (where most of the indigenous population lives) show quite low indicators of human development. For example, 8 percent of the total population of Peru is illiterate (compared to 13 percent of the Bolivian population), illiterate women represent 12 percent of the total and this percentage rises to 30 percent in rural areas (in Bolivia the corresponding figures are 12 and 26 percent, respectively, ECLAC, 2016 and the World Bank, 2017). The situation is particularly severe in the case of women, and even more so in rural indigenous women, in spite of the social advances that have taken place in the last decade with regard to the greater attention given to gender equality, political participation of women, their empowerment and inclusion in the labor market

2 https://data.worldbank.org/indicator/SI.POV.GINI.

still presents problems for societies in the Andean countries. In general (ECLAC, 2016), women still have less access to productive and financial resources, as well as to monetary resources, training and the use of different technologies. In addition, gender violence has grown enormously throughout the region (WHO, 2013).

To all this we must add that the advances of recent years have had little impact at the economic structural level: The region continues to be characterized by a high dependence on the primary export sector and by "structural heterogeneity" (ECLAC, 2016) which is expressed in a persistent poverty and the existence of acute social inequalities. The productive structure, which is not very diversified and highly heterogeneous, in which the low productivity sectors generate approximately 50 percent of employment, constitutes a fundamental determinant of inequality and poverty.

Table 2
Magnitude of Poverty and Indigence in the Andean Region, 1990 - 2014

Country	Year	Population below the poverty line a /					Population under the indigence line				
		Total country	Urban zones			Rural Zones	Total country	Urban zones			Rural zone
			Total	Metro-politan Area	Urban rest			Total	Metro-politan area	Urban rest	
Bolivia	1989	…	52,6	…	…	…		23,0	…	…	…
	2000	63,7	52,4	48,7	58,7	83,4	38,8	21,4	17,8	27,6	69,0
	2004	63,9	53,8	50,5	60,4	80,6	34,7	20,2	17,3	26,0	58,8
	2007	54,0	42,4	40,6	44,9	75,8	31,2	16,2	15,4	17,4	59,0
	2013	32,7	22,3	…	…	54,1	16,8	7,4	…	…	36,3
Colombia	1991	56,1	52,7	…	…	60,7	26,1	20,0	…	…	34,3
	2002 b/	49,7	45,7	31,6	49,6	61,2	17,8	12,4	7,0	13,9	33,0
	2008 b/	42,2	37,3	19,7	42,3	57,2	16,5	11,2	3,4	13,3	33,0
	2010 b/	37,3	33,2	15,6	38,1	50,5	12,3	8,2	2,6	9,7	25,5
	2014 b/	28,6	24,7	10,2	28,8	41,5	8,1	5,1	1,9	6,0	18,1
Ecuador	1990	…	62,1	…	…	…	…	26,2	…	…	…
	2000	61,6	59,4	…	…	65,7	31,8	27,6	…	…	39,4
	2005	48,3	45,2	…	…	54,5	21,2	17,1	…	…	29,2
	2010	39,1	37,1	…	…	43,1	16,4	14,2	…	…	20,8
	2014	29,8	31,0	…	…	27,3	10,3	9,9	…	…	11,3
Perú	1997	47,5	33,6	…	…	72,7	25,0	9,7	…	…	52,7
	1999	48,6	36,1	…	…	72,5	22,4	9,3	…	…	47,3
	2005 c/	48,7	36,8	…	…	70,9	17,4	6,3	…	…	37,9
	2010 c/	34,3	20,0	…	…	61,0	9,5	1,9	…	…	23,8
	2014 c/	22,7	15,3	…	…	46,0	4,3	1,0	…	…	14,6

Country	Year	Population below the poverty line a /					Population under the indigence line				
		Total country	Urban zones			Rural Zones	Total country	Urban zones			Rural zone
			Total	Metro-politan Area	Urban rest			Total	Metro-politan area	Urban rest	
Venezuela d/	1990	39,8	38,6	29,2	41,2	46,0	14,4	13,1	8,0	14,5	21,3
	2000	44,0	…	…	…	…	18,0	…	…	…	…
	2005	37,1	…	…	…	…	15,9	…	…	…	…
	2010	27,8	…	…	…	…	10,7	…	…	…	…
	2013e/	32,1	…	…	…	…	9,8	…	…	…	…
Latin America f/	1980	40,5	29,8	…	…	59,8	18,6	10,6	…	…	32,7
	1990	48,4	41,4	…	…	65,2	22,6	15,3	…	…	40,1
	2002	43,9	38,3	…	…	62,4	19,3	13,4	…	…	38,4
	2005	39,7	34,0	…	…	59,8	15,4	10,3	…	…	33,3
	2010	31,1	25,6	…	…	52,4	12,1	7,7	…	…	29,5
	2014	28,2	23,8	…	…	46,2	11,8	8,0	…	…	27,6

Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of special tabulations of household surveys in the respective countries.
Elaboration: ECLAC (2016).
Notes:
a / Includes people under the indigence line or in extreme poverty.
b / Figures from the National Planning Department (DNP) and the National Administrative Department of Statistics (DANE) of Colombia. The figures from 2002 onwards are not strictly comparable with the previous ones, due to methodological changes made by the DNP-DANE.
c / Figures from the National Institute of Statistics and Informatics (INEI) of Peru. The figures from 2004 onwards are not strictly comparable with the previous ones, due to methodological changes made by the INEI.
d / As of 1998, the sample design of the survey does not allow the urban-rural breakdown. Therefore, the figures correspond to the national total.
e / Figures from the National Institute of Statistics (INE) of the Bolivarian Republic of Venezuela, the figures are not comparable with those of previous years.
f / Estimate for 18 countries in the region plus Haiti.
…No information.

In addition, there is evidence that the growth of recent years was apparently not pro-poor and it would be considered that it did not reach the poorest layers in a massive way (Stampini et al., 2016, see Table 2) or poorest regions or territories. The increase in income was not distributed in a balanced manner. As a result, poverty in some countries, especially in rural areas, has been stubbornly difficult to reduce. To this must be added high inequality (income, health and education) and low social mobility among the different sectors of the population, which trap their opportunities and reduce their expectations of well-being. As a consequence, new inequalities emerged leaving behind the most vulnerable sectors: the indigenous population of rural areas and women.

Challenges for Sustainability

On the other hand, the growth of recent years has generated a series of new challenges in terms of sustainable development and equality. First, the general increase in consumption

translated into higher Co_2 emissions (exponential growth of the automotive parks, especially in the urban centers that imported a significant amount of used cars) and a use of plastic in line with a lifestyle assumed as "modern". The consequences are associated with several environmental problems (air pollution, water and land) that need to be agenda topics in the future, in favor of an effective environmental policy.

In the same line, the strategy of economic development based on the extraction of natural resources (which some authors call "neo-extractives", see Burchardt and Dietz, 2015) was very harmful to the environment (due to the installation of mega-mining that uses toxic agents in their productive process or the use of pesticides in agro-industry) and caused social conflicts with the local population in many places, both due to environmental considerations and competition for scarce resources (see Arellano Yanguas, 2011; Bebbington, 2012, Göbel and Ulloa, 2014, Haslam and Tanimoune, 2015, Dietz and Engels, 2016).

To these new problems is added the fact that the economic boom has ended or at least the economic activity points to a softened recession of the economic cycle. With the contraction of Asian demand as of 2013, the prices of raw materials exported by the region (oil, natural gas and minerals such as copper, silver, gold) collapsed, causing the end of the super cycle of global demand for raw materials. This situation has brought serious challenges for the region in terms of the sustainability of the social advances of the last decades that depended to a large extent on the increase in income from the extractive sector. The fall in prices translated into reduced national budgets and with it a reduced capacity of the States to maintain their social policies. In addition, we begin to see negative effects on labor markets and family income. Therefore, in its last report, UNDP-Bolivia warned that there is a danger that families who were able to leave poverty and join the middle classes may fall back below the poverty line (UNDP, 2016) in a vicious circle that would ensnare Bolivian households in poverty again, in Ecuador and Peru the situation is no different and Venezuela and for several years now households are facing a highly worrying income crisis (Stampini et al., 2016).

Finally, the region continues to suffer from weaknesses in its public institutions, which are not very transparent or frankly corrupt, as well as a strong political polarization. Both factors hinder the generation of sustainable and equitable development because they prevent the efficient allocation of resources for vulnerable groups. In addition, the political crisis tends to mislead the look of economic and social needs towards questions of strategies and power tactics. In Latin America since its return to democracy, there has been a significant number of conflicts, according to several studies the social conflict has a defining equidistance with economic growth.

In the absence of social conflict, a society is expected to have higher levels of economic growth. The presence of social conflicts such as: the marches, strikes and the blocking of roads, disturb and erode the circuit of the market economy. Social conflict affects business competitiveness, paralyzes the productive apparatus, increases expenses, reduces revenues, makes markets lose, reduces investments, increases risk country status, increases unemployment and generates many other pernicious effects which end up reducing economic growth eroding sustainable development (Velásquez, I. and Gittins, P., 2016).

About the articles compiled in this volume

The research gathered in this compilation critically analyzes the political and economic developments of the last years in the Andean region marked by the boom and highlights both the persistent problems, as well as a series of challenges generated by the post-boom situation. It can be grouped from six fundamental problems that characterize the situation of the Andean post-boom countries: sub-national traps, deficiencies in the institutional designs implemented during the boom stage, stagnation in the labor market, lack of pro-poor growth and reduced social mobility and symbolic dimension of well-being.

First, several articles identify structural causes that limit the possibilities of reducing inequality and poverty. In many territories (urban and rural) these factors intermingle, constituting what the literature calls poverty traps (TdP) and inequality traps (TdD). While the TdP emphasize the fact that poverty through a series of mechanisms such as lack of education and access to health, residence in remote places, without infrastructure, without services tends to perpetuate poverty, which inhibits social mobility, the concept of TdD it refers to a systemic-social level. Inequality traps (TdD) are situations where, in summary form, one group of the population is poor, because another is rich. It is a concept that describes situations in which the entire distribution of goods is stable since all the different dimensions of inequality (in wealth, power and social status) interact to protect the rich from downward mobility, and to prevent the poor from ascend in the social ladder (Rao, 2006). By the way, poverty and inequality are not the same. But, the concept of TdP emphasizes that social inequalities and asymmetries in terms of political power that they include tend to perpetuate poverty by inhibiting their reduction through various mechanisms (Schorr, 2018). Undoing these traps requires a political approach beyond technical instruments and the generation of monetary income that focuses on power relations at local, national and even global levels.

Traps are disastrous for development opportunities: they prevent a more equitable reduction of poverty and a more uniform generation of state capacities in different sub-national territories. The contributions of Marco Just and Mercy Orellana Bravo, Rodrigo Mendieta Muñoz, and Nelson Tapia Olvera focus on the situation of economic development and poverty at the subnational level in Bolivia and Ecuador. Just argues that territorial inequalities have a structural-historical basis which leads to their persistence over time. To sustain his argument, he examines the territorial distribution of public services in Bolivia in the last bonanza period of commodities. Taking the municipalities as a unit of observation, their analysis generates original ideas about the persistence of significant inequalities in the provision of basic public services. Their results show that the relative distribution patterns of the provision of local public services remain practically unchanged since the 2000s. Furthermore, it identifies that the structural variables related to the local economy and demography seem to determine variations in the strongest public services, than the local institutional and fiscal characteristics.

Orellana, Mendieta and Tapia analyze the spatial scope of multidimensional poverty in Ecuador, its objective is to determine the existence of a mutual spatial dependence between different geographic sectors of the country and its variation over time. They find that the spatial autocorrelation of poverty indicators for the years analyzed is significant

and positive in nature, which implies that poverty at the cantonal level is linked to the behavior of this phenomenon in its neighboring municipalities, showing a higher level of dependence on poverty the year 2010. They also identify that it is possible to determine the possible conformation of poverty conglomerates. On the other hand, they show a reduction in poverty at the national level throughout the periods analyzed, which responds to factors such as the expansion of the coverage of services and improvements in educational attainment in Ecuador. The two studies show that the traps could not be unlocked during the last boom, since the trapped places are far from the central axis and the main cities that have a better relative development.

The causes for these traps can be several: Just identifies the absence of incentives of the global market and a poor economic diversification due to failures of national and local public policy. This underscores the importance of political intervention and state agencies in the local economy. In terms of public policies, the existence of these trapped regions calls for a more focused poverty reduction policy to solve the needs of these regions. Orellana, Mendieta and Tapia express that poverty eradication policies must take into account the spatial distribution of poverty. The analysis suggests that localization is an important factor to be considered in analyzing poverty: in Ecuador, cantons with high poverty rates are found in the eastern provinces. This could be due to different reasons such as less access to education, access to services and housing conditions that are heterogeneously distributed throughout Ecuador.

Secondly, the contributions of Pablo Evia, Nelson Chacón and Horacio Valencia and Horacio Vera and Marcelo Gantier focus on the impact on poverty reduction and inequality that the (re-) distributive policies implemented have had in recent years in Bolivia. Evia investigates horizontal inequality, which refers to the difference in income due to belonging to a specific social group, determined, for example, by race, sex, location, etc., using a tax benefit incidence analysis model to evaluate the role of net public transfers in horizontal inequality in Bolivia for the year 2015.

Second, on the deficiencies of institutional design in the implementation of policies during the economic boom, Chacón and Valencia analyze the super-cycle of raw materials that has allowed Bolivia to grow above its historical level in recent years. They evaluate the process of redistribution of resources through conditional transfers with the objective of increasing the stock of human capital and reducing the risks of poverty. While the transfers undoubtedly had an impact, the researchers find that it is not what was expected. They identify that because of failures in the institutional design, the instruments do not serve the needs of the poorest. The problem lies, according to the authors, in the lack of mechanisms for targeting transfers: the lack of targeting generates a high percentage of "leaks", meaning that non-poor people receive transfers. Therefore, the authors conclude that it would be vague to consider the policies of conditional transfers as effective for poverty reduction in the Bolivian case.

In relation to redistributive extractive income policies, Vera and Gantier review the policy of gas income distribution between producing and non-producing regions, using census data (2001-2012) in order to analyze their possible differential impact in terms of indicators of HDI for health, education and employment.

The authors find that the production of hydrocarbons is related to better access and greater use of health services and better access to educational services. However, these

differences weaken as the comparison group becomes more specific. Likewise, the evidence also shows that gas producing municipalities do not benefit from receiving larger transfers than the rest of the municipalities.

In sum, the three investigations show the limited impacts of the distributive policies in Bolivia. In some way, conditional transfers, although it is a mechanism to distribute income, it is important to ensure the suitability and results of these programs. In this sense, the studies would suggest reformulating these policies in order to make them more effective through the design of targeting mechanisms and new distribution rules in spatial terms.

The contribution of Laura Álvarez shows us a different example, that of an institutional design to promote attraction to investment and infrastructure development through mechanisms of works for tax, which being functional in the scenario of extractive boom may not be sustainable in the new post-boom context Much of the income boom that the Andean region experienced was due to extractive activities, especially associated with the mining sector, which grew significantly since the late 1990s. In several Latin American countries there was an increase of 500 percent in the budgets for investment in exploration between 2003 and 2010. Among the factors that generated favorable conditions for mining growth, public policies that gave higher legal certainty stand out the investments and those that granted specific incentives. Within the latter, Álvarez specifically analyzes the new incentive policies that are oriented to the development of infrastructure based on the "Works for Taxes" Act, enacted in Peru. The author interprets "Works for Taxes" as a response of the Peruvian State to the public debate on the extraordinary profits that mining companies have in times of rising international prices of metals, to demands for the few benefits generated by this activity in the territories and the social conflicts that this entails (not so, to conflicts over environmental demands). Álvarez considers that the law maintains silence about the character of the works. Consequently, companies tend to generate material conditions that are important for extractive activity (for example, infrastructure) and with which they benefit themselves first and not the communities where mining takes place.

Third, the development of the labor market and its possible impact on the increase of social mobility are analyzed. Carmen Marull Maita studies the developments in the mobility of income in the Peruvian labor market during the boom and in the post-boom. The author finds that there was a significant positive impact during the boom: Revenues increased, that is, the analysis of mobility by groups of workers shows that during the boom period, those groups that initially presented low average labor income were in many cases, those that presented higher levels of mobility compared to their counterparts. By contrast, during the post-boom period, groups with high initial income had higher levels of mobility than the rest. Marull studies and illustrates Peru's dependence on economic cycles in the extractives sector. Like Just on Bolivia calls for greater diversification of the economy to get out of dependence and reduce vulnerability to "external shocks" as falls in global prices of raw materials.

Fourth, economic growth, if it is pro-poor, it is related to the reduction of poverty and the improvement of the status of households through social mobility. Julio Humérez and Iván Velásquez-Castellanos and Ludwing Torres Carrasco study growth, poverty

levels and social mobility in Bolivia. In particular, Humérez analyzes the relationship of economic growth and the reduction of poverty and the influence that the distribution of income in households can have. Thus, it tries to show the relationship between economic growth and changes in the socio-economic situation of the population. The results of the decomposition (Datt-Ravallion) at the urban and rural areas indicate that in the first case the growth effect reasonably explains the reduction of poverty throughout the period, while in the rural area the estimates diverge from the official figures systematically from the year 2008, showing a very weak relationship between poverty reduction and growth. Rather, conditional transfers would explain the decline in poverty levels.

Velásquez-Castellanos and Torres Carrasco analyze social mobility. His analysis starts considering that poverty, inequality and social mobility are phenomena that are definitely linked. Societies where poverty levels are high and inequality reaches the population as a whole among the different strata of society, there will be mobility among its inhabitants, also when economic opportunities and human development favor small groups of society, very likely that poverty and inequality are persistent and high as in the Bolivian case. In this sense, if the concentration of opportunities is persistent over time and, therefore, there is little social mobility, poverty and inequality will tend to perpetuate. With the research, the authors quantify the social mobility in Bolivia and identify its trend over time between 1996 and 2016, investigating its relationship with poverty and inequality, and seeking to provide an explanation to the movements and trends nuanced by the political, economic changes and social issues that Bolivia went through. The results of the estimations show a progressive increase of social mobility in the last 20 years, especially in the boom phase (2006-2013), which was marked by a reduction among the high income stratum, and increases in the middle and low strata, which means that the growth experienced by Bolivia and the redistribution of income in the last period served to reduce extreme poverty. They note that the bonanza brought relative mobility to low-income households that changed their status to medium / low income. The tertiary sector of the economy such as commerce is the standard-bearer in the generation of income, meaning that a large number of heads of households improved their income by engaging in the trade of goods and services. In the field of inequality, the authors classify the reductions reached rather as modest given the huge economic boom.

Fifth, Daniel Moreno focuses on the relationship between the perception of inequality and well-being in the Andean region. The research focuses precisely on the perceptions that citizens have about inequality and other issues that, like subjective well-being, are directly linked to it. For that, it analyzes data from the main public opinion surveys that are conducted in the country (Latin American Public Opinion Project (LAPOP), Latinobarómetro and the World Values Survey) to account for the evolution of perceptions on these issues, discussing its relationship with the evolution of the objective indicators of inequality and quality of life, both at the national level and at the subnational level. It notes that the perception of injustice in the distribution of income has been decreasing. Citizens believe that the distribution of income in their country is less unfair. The author also finds that the demand for a redistributive state has been reduced. Likewise, satisfaction with life

depends on the perception of justice in the distribution of income. This finding shows that the quality of life, evaluated by the citizens themselves in relation to the satisfaction they have with their lives, tends to be higher in societies with less perceived injustice in the distribution of income. Therefore, Moreno concludes that there is a political dimension of perception about inequality. Non-economic factors affect the perception of justice and the distribution of income, as well as the perception of the policies that the state should adopt to promote equality.

These factors are, at least in part, political and in countries with strong populist leaderships, they have to do directly with the position of citizens against the government.

On the institutional collaboration between KAS and TRANDES

This volume has been the result of collaboration between the Konrad Adenauer Foundation (KAS) and the Postgraduate Program in Sustainable Development and Social Inequalities in the Andean Region (trAndeS) The strengthening of democracy and the rule of law are the traditional fields of the activity that develops and will continue to develop the Konrad Adenauer Foundation (KAS) in Bolivia and in Latin America. In the economic sphere, the orientation is aimed at supporting the theme of the Social Market Economy (ESM) in general, the economy and public policies that improve the well-being of Latin Americans in particular. Respect for the dignity of the human being, their right to design their life with responsibility and according to personal parameters, became the foundation of the new model of a liberal economy, beyond all economic theory; likewise, the democratic organization of political freedom, respecting the social component, economic and social freedoms, are the foundations found in the work agenda of the KAS in Latin America. With the objective of supporting this work agenda, the "KAS Analysis" is born, which is an annual publication presented by the Bolivia Office of the KAS for more than a decade and the idea of this research space is to generate institutional synergies and establish a network, to be able to collect empirical research based on data to understand the Latin American reality. In this issue (KAS Analysis 01 / 2017-18) we are honored to have the support of the trAndeS program.

trAndeS - Graduate Program in Social Inequalities and Sustainable Development in the Andean Region was born as a joint initiative between the Freie Universität Berlin (FU Berlin) and the Pontificia Universidad Católica del Perú (PUCP). trAndeS seeks to create and disseminate scientific knowledge that can contribute to the achievement of the Sustainable Development Goals of the United Nations, throughout the Andean Region. The trAndeS research program is based on the recognition of the close links between social inequalities and sustainable development in the Andean region. In particular, it focuses on how multidimensional inequalities inhibit and hinder sustainable development. trAndeS includes three axes of work: Postgraduate training, interdisciplinary research and the Transandina Sustainability Network (Red trAndeS). Through this network the call was made for the investigations that are part of this document and its platform served for the selection of articles. trAndeS is financed by the Federal Ministry of Economic Cooperation and Development of Germany (Bundesministerium für Wirtschaftliche Zusammenarbeit

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Persisting Inequalities in Boom Times: Analyzing local public service variations in Bolivia (2001-2012)

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Abstract

This paper examines the territorial distribution of public services in Bolivia in the latest commodity boom period of basic products. Taking the Municipalities as observation unit, the analysis generates original insights about the persistence of significant inequalities in the provision of basic public services. Based on census data from 1992, 2001 and 2012, the paper presents a unique version of the UNDP *State Density Index* as public service indicator, calculated for the Bolivian Municipalities. Using a novel data set of explanatory variables, a correlation analysis is applied in order to approach the underlying service determinants. The results show that the relative distribution patterns of local public service provision remain largely unchanged since the 2000s. Further, structural variables related to the local economy and demography appears to determine public service variations stronger than local institutional and fiscal features. Finally, the analysis recommends considering more durable formation processes when analyzing contemporary state manifestations in Bolivian.

Keywords: Public Service Variations, Commodity Boom for Basic Products, Bolivian Municipalities

1. Introduction

A fundamental cause of inequality derives from the uneven capacity of states to effectively implement chosen public policies across their territory (Mann 1984, Soifer and Vom Hau 2008, Soifer 2015). As seminally discussed by Guillermo O'Donnell for Latin American

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countries, state activity in the region displays a distinctively high degree of irregularity or unevenness "throughout the territory and across the existing social stratification" (1993:1358). Against this backdrop, Bolivia has been considered one of the leading representatives of this phenomenon (Whitehead 1994, UNDP 2007, Gray Molina 2008, Soifer 2015). This becomes particularly evident when focusing on the local variations of basic public service provision. As documented in the latest Census (INE 2012), geographical service disparities affect nearly all sectors –from health care and education to electricity and water provision–, across all Departments and Provinces.

The apparent prevalence of these territorial inequalities stands in contrast to the unprecedented state revenue bonanza of the past decade. Spurred by the high world market prices for raw materials, the Bolivian state has been channeling large public funds through different distribution mechanisms, particularly investing in infrastructure and cash transfer programs (Gray Molina 2008, Crabtree and Chaplin 2013, Farthing and Kohl 2014). However, these efforts appear to have only marginal balancing effects when focusing on the observable public service inequalities at the local level. This situation pose the question regarding the impact of the beneficial economic context of the past decade on the territorial distribution of public services.

This paper provides fresh perspectives on the issue raised. Taking the Municipalities as observation unit, the analysis generates insights about the persistence of significant inequalities in the provision of basic public services at the local level. Based on census data from 2001 and 2012, the paper presents a unique version of the UNDP State Density Index (SDI) as public service proxy, calculated for all 339 Bolivian Municipalities. Despite exploring the composition of territorial public service patterns the paper goes further in the analysis. Using selected possible explanatory variables, a correlation analysis is applied in order to approach the determinants underlying the observed local service disparities.

The first section of the paper introduces the methodological considerations when seeking to measure territorial variations in public service terms. In particular, it discusses the analytical advantages of the adopted UNDP State Density Index methodology (UNDP 2010). The second section presents the most important findings regarding the locally differing public service manifestations and respective variations between 2001 and 2012. Thereby, descriptive statistics and cartographic tools are applied to the SDI calculations. The third section explores a set of possible determinants of the identified public service patterns and discusses the statistically calculated associations with the SDI. Finally, the concluding section provides an outlook, indicating to continuing aspects of the raised issues for future research.

2. Measuring Local Public Service Variations in Bolivia

The existing public sector and state capacity literature has generated a vast "industry of indicators" (Soifer 2015:9) for measuring the public service capabilities of states. As a result, a plethora of measurement suggestions are competing, varying in particular regarding the kind and combination of the used data (Altman and Luna 2012, Hanson and

Sigman 2013). Accordingly, public service capabilities can be either based on a single or an aggregate of several proxies. A further difference concerns the use of "objective" data (for instance statistical service records), or "subjective" data (for example expert surveys) (Savoia and Sen 2012:5). Finally, there is a major issue on the selection of the scale and unit of observation (Snyder 2001, Soifer 2012, Rodrigues-Silveira 2013).

Several authors suggest using aggregated indicators based on "objective" service records, especially when they capture public service levels below the national scale (Snyder 2001, Soifer 2012, Rodrigues-Silveira 2013). Hence, it is thoughtful to employ data that can be disaggregated geographically. Likewise, it is more advantageous to measure output data, definable as "the products of state action (what states have done)", which is quite different from the service outcome, understood as "the impact of products [of state action] on the expected social indicators" (Rodrigues-Silveira 2016:6).

Considering these requirements for a suitable indicator selection, the *State Density Indicator* (SDI), originally developed by the United Nations Development Program Peru, appears very promising. In 2010, UNDP Peru presented in its yearly report a novel approach to conceptualize and measure state action in the field of basic public service provision. Thereby, the SDI captures the actual performance of the State at the moment of service delivery within a defined territorial area (UNDP 2010:29). On the basis of census data, the SDI measures the territorial public service reach in five policy sectors: health care, education, personal identification, water and electricity provision (UNDP 2010:30). Correspondingly, the level of state density depends on the number and coverage of public services in each dimension. The density of the state is higher where the public service output reaches a higher share of the local population.

Following the original methodology (UNDP 2010, 167-172), the SDI approaches the referred policy fields by using subsequent indicators (table 1). Health care service provision is measured by the number of doctors per ten thousand inhabitants. The education dimension is captured through the net secondary school attendance rate, which is the ratio between children actually enrolled in the secondary school and the total amount of children in the official enrolment age (12 to 17 years in Bolivia). Personal identification originally measures the percentage of citizens under 18, holding a birth certificate, as well citizens over 18 possessing an identity card. This last sub-indicator has been omitted in the index compilation for Bolivia due to missing information before 2012. The remaining service indicators, water and electricity provision, measure the percentage of households with access to electricity supply and piped potable water. Following Rodrigues-Silveria (2016), the compiled SDI for Bolivia is based on a slightly distinct aggregation formula than the original SDI.[2]

2 First, in order to enable a further decomposition of the SDI (male/female, urban/rural, indigenous/non-indigenous), the sub-indicators are calculated by using information per person and not per household. Second, the aggregation formula for the overall SDI captures exclusively the range of possibilities between the minimum and maximum values of the selected sub-indicators. Thus, the calculation becomes more sensitive because it avoids the distorting impact of particularly high or low values (Rodrigues-Silveria 2016:20).

Table 1
Dimensions of the State Density Index Bolivia

N°	Dimension	Indicators (SDI original)	Indicators (SDI Bolivia)	Sources Bolivia
D1	Health care	Doctors per 10 thousand Inhabitants	✓	Ministry of Health, 01/11
D2	Education	Net secondary attendance rate (%)	✓	Census 01/12
D3	Identification	Pers. under 18 with Birth certificate (%)	✓	Census 01/12
		Pers. over 18 with ID (%)	X	
D4	Infrastructure	Pers. access to Electricity (%)	✓	Census 92/ 01/12
D5	Sanitation	Pers. access to Running Water (%)	✓	Census 92/ 01/12

Source: own elaboration.

Finally calculated, the SDI ranges from 0 to 1, where 1 represents perfect public service density and 0 no coverage. The following section presents the results of the SDI calculation for the Bolivian Municipalities for three moments in time (1992, 2001 and 2012).

3. The territorial manifestations of the State Density Index Bolivia

Table 2 provides a descriptive summary of the SDI Bolivia 2012. The average lies around 0.535 while the 339 cases range from the minimum 0.163 to the maximum value of 0.837. As the median indicates, 50% of the cases are located below 0.552. To proceed systematically with the exploration of the territorial SDI manifestation, the analysis starts off with three commonly observed features of uneven state development in Bolivian.

Table 2
Summary of Standard Measures of the State Density Index Bolivia 2012

Min.	Q.25	Median	Average	Q.75	Max.	R	IQR	SD
0.163	0.455	**0.552**	**0.535**	0.631	0.837	0.67	0.18	0.129

Source: own elaboration.

The first paradigmatic feature concerns the inequality between the Bolivian Departments (Roca 1980, UNDP 2007, 2010, Paz Araujo 2008). Jose Luis Roca (1980:9) prominently described the history of Bolivia as a continuous struggle between its economically and culturally uneven regions. This observation has again become very topical since the increasing autonomy ambitions on behalf of the Eastern lowland Departments (*Media Luna*) from the mid-2000s. Thereby, the disagreement on the uneven distribution of fiscal resources and public goods constitutes a fixed component within the autonomy debate (UNDP 2007, Paz Araujo 2008). Hence, examining the SDI through the departmental lens appears a convenient starting point.

Table 3 shows by department, the SDI standard measures for the 339 municipalities. The Municipalities of the Department Tarija display in average the highest public service density with an SDI average value of 0.64. The Departments of La Paz, Santa Cruz and Cochabamba as well as the Department Oruro are following with similar SDI averages around 0.57. The Departments Potosí, Chuquisaca, and Beni display in average slightly lower SDI values. The Department of Pando exhibits by far the lowest SDI average score (0.36), which accounts for only half of the leading Department Tarija. Nonetheless, with the exception of Pando, the departmental SDI variations are not as distinctively strong as expected.

Table 3
Summary of Standard Measures SDI Bolivia 2012 per Department

Depto.	N° of Mun.	Min.	Q.25	Median	Average	Q.75	Max.	R	IQR	Rmin-m	Rm-max
Tarija	11	0.543	0.585	**0.608**	**0.637**	0.681	0.761	0.22	0.10	0.07	0.15
La Paz	87	0.277	0.515	**0.573**	**0.569**	0.627	0.837	0.56	0.11	0.30	0.26
Santa Cruz	56	0.275	0.485	**0.575**	**0.553**	0.633	0.765	0.49	0.15	0.30	0.19
Cochabamba	47	0.238	0.439	**0.569**	**0.544**	0.661	0.753	0.52	0.22	0.33	0.18
Oruro	35	0.277	0.449	**0.537**	**0.544**	0.597	0.825	0.55	0.15	0.26	0.29
Bolivia	339	0.163	0.455	**0.552**	**0.535**	0.631	0.837	0.67	0.18	0.39	0.26
Potosi	40	0.256	0.408	**0.558**	**0.530**	0.642	0.768	0.51	0.23	0.30	0.21
Chuquisaca	29	0.288	0.415	**0.508**	**0.495**	0.554	0.822	0.53	0.14	0.22	0.31
Beni	19	0.163	0.380	**0.440**	**0.436**	0.514	0.664	0.50	0.13	0.28	0.22
Pando	15	0.178	0.241	**0.299**	**0.355**	0.386	0.732	0.55	0.14	0.12	0.43

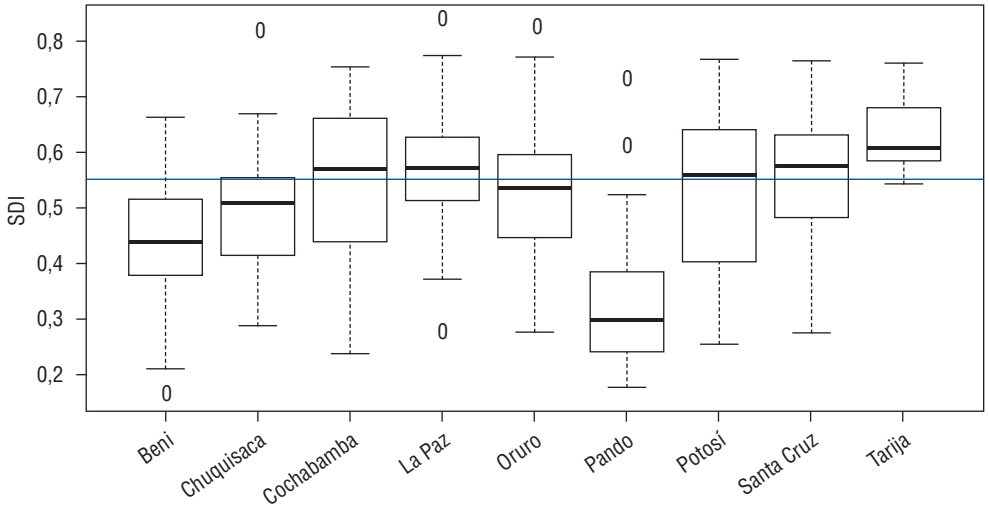
Source: own elaboration, data: INE Bolivia Census 2012.

However, focusing solely on the average values of the Departments would hide the existence of much stronger pronounced intra-departmental SDI variations. The ranges (R) between the Municipalities with the lowest and respectively the highest SDI in each Department, proof the scattering of the measurement values to be unanimously present in all Departments. La Paz (0.56), Oruro (0.55) and Pando (0.55) display the most extreme variations, while only the Municipalities of Tarija with a range value of 0.22 exhibit a relative homogeneity.

These intra-departmental variations in the public service provision become more specific when comparing the quartile information, below additionally visualized in the box plot (Graph 1).[3] Even when excluding the extreme cases and computing the range within the middle 50 percent of Municipalities (IQR), the values confirm the presence of significant variations. Potosí (0.23) and Cochabamba (0.22) are leading, while Tarija (0.1) and La Paz (0.11) display the smallest IQRs. This averages that in the case of first ones, the variation is concentrated in the middle 50 percent, while in the case of latter the variation must be looked for in the upper quartile Q.75 or in the lower quartile Q.25.

3 Boxplots display groups of numerical data through their quartiles: lower quartile (25% of data is less than indicated value), median (50% of data is lower than indicated value), upper quartile (25% of data is greater than indicated value).

Graph 1
Box Plot of the SDI Bolivia 2012 per Department and National Average



Source: own elaboration, data: INE Bolivia Census 2012.

The calculation R_{min-m} (median minus the minimum value) as well as R_{m-max} (maximum value minus median) provides further scattering information. In the cases of Cochabamba (0.33), Santa Cruz (0.3), Potosí (0.3) and La Paz (0.3), the SDI variations appear to be more concentrated in the lower quartile. In turn, in Pando (0.43), Chuquisaca (0.31) and Oruro (0.29) the variation is stronger in the upper quartile. Regarding the entire country, intra-departmental variations tend to accumulate in the lower quartile (0.39). Concluding this first examination, it can be stated that the presented data points to the higher significance of intra-departmental SDI variations than SDI disparities between the Departments. Hence, the departmental cleavage does not characterize sufficiently, the public service manifestation in current Bolivia situation.

The second cleavage mentioned in the literature concerns the classical urban-rural division (Zuazo 2012). UNDP Bolivia (2010b:31) describes this cleavage as one of the historically most persistent inequality dimensions in Bolivia. It is important to note, that urbanization is statistically defined in Bolivia according to a strict population size criteria: localities with more than 2.000 habitants are classified as urban. The urbanization rate of a Municipality is equivalent to the number of urban localities expressed in percentage. The urbanization rate is therefore the most suitable measure for population density, which has to be distinguished from the municipal population size.[4]

4 A Municipality can have a large population size while at the same time displaying low urbanization rates. This is the case in territorially extensive Municipalities with few urban centers or in the predominantly rural and indigenous areas with a large but distinctively dispersed population.

Table 4 provides the SDI average values of Municipalities per Department categorized by rural and urban areas. N° indicates the amount of Municipalities corresponding to the respective category by Department. The national average shows that the existing 71 urban Municipalities display generally higher SDI values (0.64) in comparison to the 268 rural Municipalities (0.51). In some Departments urban Municipalities demonstrate notably higher SDI values, for instance in Chuquisaca, Pando and Oruro. However, in the remaining Departments, rural Municipalities show in average only slight disparities to its urban counterparts (< 0.2). Hence, while the urban-rural cleavage is apparently reflected in the SDI, the evidence is still too ambiguous to serve as main characterizing feature of the sub-national public service variations. Not only are the average variations rather weak, but the ratio between urban and rural Municipalities is very unbalanced in the majority of Departments (for instance 1:28 in Chuquisaca, 7:80 in La Paz, 2:13 in Pando). This produces a distorting effect, which hinders a representative prediction. As elucidates below, it requires more sophisticated techniques to estimate the real effect of urbanization on the public service provision.

Table 4
SDI Average Values of Urban and Rural Municipalities per Department

Department	Urban	N°	Rural	N°	Variation
Chuquisaca	0.822	1	0.484	28	0.338
La Paz	0.699	7	0.557	80	0.142
Cochabamba	0.695	10	0.504	37	0.191
Oruro	0.745	3	0.525	32	0.220
Potosi	0.691	6	0.502	34	0.189
Tarija	0.719	4	0.591	7	0.128
Santa Cruz	0.606	28	0.500	28	0.106
Beni	0.508	10	0.356	9	0.152
Pando	0.671	2	0.306	13	0.365
Bolivia	0.638	71	0.507	268	0.131

Source: own elaboration, data: INE Bolivia Census 2012.

The third possibly relevant cleavage is the population size variation between the Bolivian Municipalities. Victor Ameller (1999) highlights the significant socio-economic and institutional development stagnation in the Bolivian Municipalities with the lowest population levels (96 cases identified). Accordingly, scarce fiscal resources, limited institutional capacity and missing economies of scale are the factors that hinder significant progress (Ameller 1999:47). Also Diego Ayo, Marcia Fernández and Ana Kudelka (2013:75) implicitly refer to this group of Municipalities when pointing to the specific development stagnancy in the Bolivian Municipalities with the smallest fiscal income.

Table 5 displays the average values of the SDI in the Bolivian Municipalities according to their population category per Department[5]. The results display unexpected tendencies.

5 There are four official population size categories: A: pop.< 5.000, B: pop.> 5.000, C: pop.> 15.000, D: pop.> 50.000) (SEA 2012).

While the gap between Municipalities of category D and category A exists sowing a significant difference of (0.67 vs. 0.49), the gap between category B and C is statistically almost non-existing (0.54 vs. 0.53). Also between category A and B as well as C the disparities are not distinctively strong. Here again, there are departmental differences: while in La Paz, Potosí and Pando, category A, Municipalities have slightly lower SDI values, the corresponding Municipalities in Chuquisaca, Santa Cruz, Oruro and Beni actually have better average SDI values than their category B counterparts. In one third of the Departments (Chuquisaca, Potosí and Santa Cruz), category A Municipalities have even higher SDI average values than category C Municipalities. This is to say, population size does not seem to characterize the SDI variations. There is no statistical evidence pointing to a representative trend of a gradually increasing SDI with an increasing population size.

Table 5
SDI Average Values of Municipalities per Dep. by Population Category

Department	Cat. A	N°	Cat.B	N°	Cat.C	N°	Cat. D	N°
Chuquisaca	0.531	5	0.485	16	0.447	7	0.822	1
La Paz	0.543	10	0.557	53	0.585	20	0.705	4
Cochabamba	0.503	5	0.527	19	0.530	16	0.656	7
Oruro	0.538	17	0.514	14	0.640	3	0.772	1
Potosi	0.524	9	0.556	13	0.500	17	0.768	1
Tarija	NA	0	0.582	3	0.637	6	0.720	2
Santa Cruz	0.579	5	0.530	22	0.552	23	0.612	6
Beni	0.422	4	0.382	8	0.477	5	0.574	2
Pando	0.261	8	0.416	6	0.732	1	NA	0
Bolivia	0.494	63	0.524	154	0.545	98	0.670	24

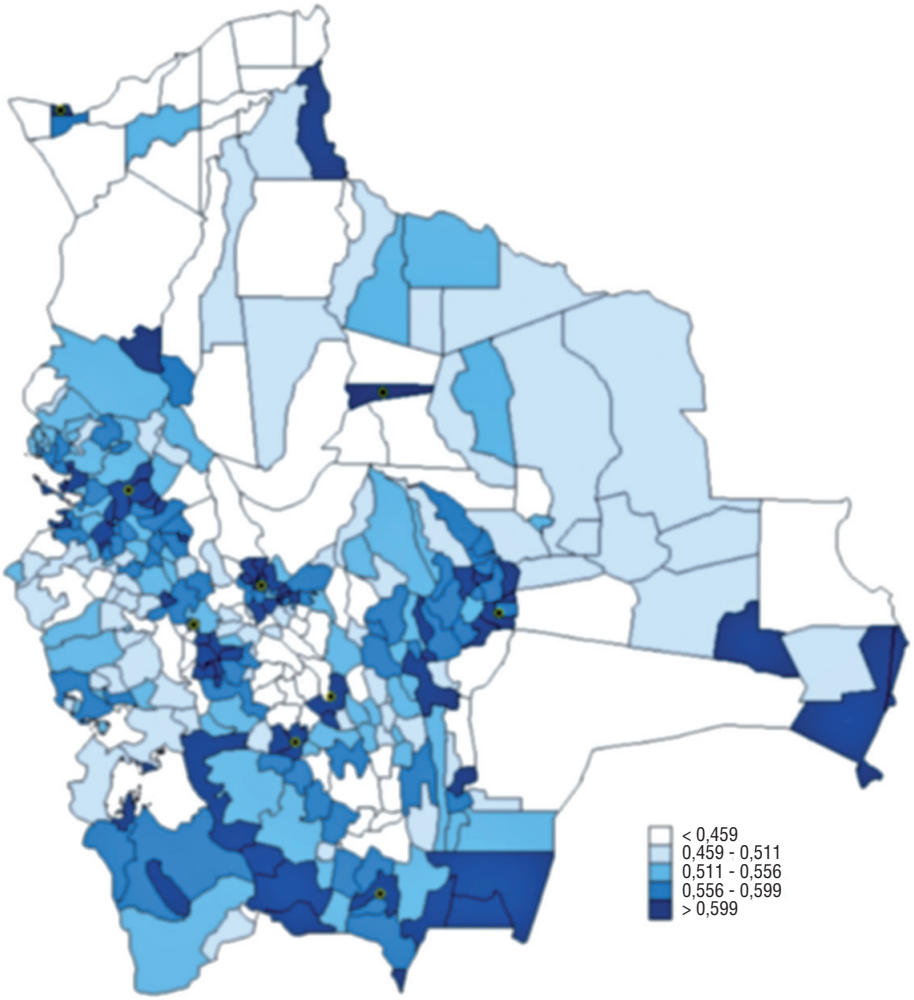
Source: own elaboration, data: INE Bolivia Census 2012.

In sum, the conducted descriptive exploration of the SDI displayed the limited relevance of the reviewed cleavages (inter-departmental inequalities, urban-rural gap and population size differences) when characterizing the sub-national variations of public service provision in contemporary Bolivia. Nevertheless, the analysis confirms the existence of significant territorial SDI disparities, possibly following a still undetected distribution logic.

In order to generate more respective insights, the analysis proceeds with cartographic techniques. Maps can be powerful tools for analysis in this regard. They constitute a form of visualization, which helps to accelerate the exploratory data analysis.

Map 1 depicts the territorial distribution of the SDI among the 339 Bolivian Municipalities. The ascribed color to each Municipality indicates the level of service density, ranging from white (minimum to no service density) to dark blue (high service density). Regional capitals are marked by the black-yellow dots.

Map 1
State Density Index Bolivia 2012



Source: own elaboration, data: INE Bolivia Census 2012.

The first observable characteristic is the high density of public services in the Departmental capitals (represented by yellow dots). Eight of nine capitals range among the top 15 Municipalities (table 6), being the city of La Paz the Municipality with the highest SDI. The cities of Sucre, Potosí and Oruro are following. Tarija, Cobija and Santa Cruz constitute the lower group of regional capitals, while Trinidad falls clearly behind (N° 54 in the national ranking). While Cobija and Trinidad reflect the general trend of low service levels in their Departments, the comparatively lower SDI values in Tarija and especially Santa Cruz might result of a continuous urban migration towards these

economically vibrant cities (see UNDP 2004). Yet, in average the SDI values of Tarija and Santa Cruz are the highest, following La Paz.

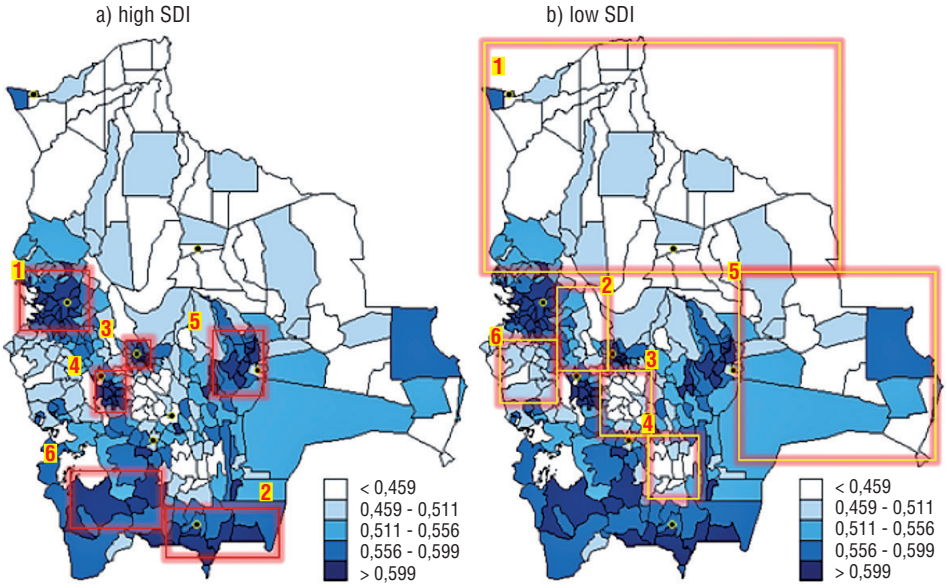
Table 6
Top 15 Municipalities with the Highest SDI 2012

Rank	Municipality	Department	Category	Urb./Rur.	SDI
1	**La Paz**	La Paz	D	U	**0.837**
2	**Huachacalla**	Oruro	A	R	**0.825**
3	**Sucre**	Chuquisaca	D	U	**0.822**
4	**El Alto**	La Paz	D	U	**0.774**
5	**Oruro**	Oruro	D	U	**0.773**
6	**Potosí**	Potosi	D	U	**0.768**
7	**Camiri**	Santa Cruz	C	U	**0.765**
8	**Tarija**	Tarija	D	U	**0.761**
9	**Huanuni**	Oruro	C	U	**0.757**
10	**Punata**	Cochabamba	C	U	**0.753**
11	**Bermejo**	Tarija	C	U	**0.753**
12	**Colcapirhua**	Cochabamba	D	U	**0.738**
13	**Cobija**	Pando	C	U	**0.732**
14	**Huatajata**	La Paz	A	R	**0.728**
15	**Santa Cruz de la Sierra**	Santa Cruz	D	U	**0.724**

Source: Own elaboration, data: INE Bolivia Census 2012.

A second characteristic is the relatively notable radial expansion of service density in the Municipalities surrounding or nearby the departmental capitals. This feature can be best observed in map 2, which provides the SDI manifestation according to spatial clusters. The first significant density cluster can be observed around the metropolis La Paz, including the populated Municipalities of El Alto and Viacha, the frontier Municipalities around Lake Titicaca as well as the coca producing *Yungas* valleys (C1). The second large cluster comprises the South-Eastern Municipalities in the Tarija Department, especially the gas producing Municipalities of the Gran Chaco region (C2). Three further clusters can be detected: First, the one constituted by the sub-urban Municipalities around the regional capital Cochabamba (C3); second, the important mining Municipalities south of the departmental capital Oruro (C4); and third, the sub-urban Municipalities and agri-business hubs in the eastern valleys surrounding the largest metropolis Santa Cruz (C5). Finally, there is a less structured cluster formation in the south-east of Potosí, comprising the mining Municipalities as for instance Uyuni and Colcha K (C6).

Map 2
State Density Index Bolivia 2012 by Clusters



Source: Own elaboration, data: INE Bolivia Census 2012.

The third characterization is related to the areas with low public service density. As map 2b and the list of the taillight Municipalities (table 7) exemplify, public service density is particularly low in the Municipalities of the Departments Pando and Beni (C1), in northern Potosí (C3) and in the Northwest of the Cochabamba Department (C2). The Bolivian Amazonas is a very sparsely populated and geographically inaccessible territory (Crabtree and Chaplin 2013:166). This feature, which is partly valid for the eastern Municipalities of the Santa Cruz Department (C5), has been historically complicating the reach of state institutions (Soruco et al. 2008, Lema 2014). The second mentioned group of Andean Municipalities is predominantly rural and mainly inhabited by indigenous population. Together with the similarly composed southern Municipalities of the Chuquisaca Department (C4) these three clusters (C2, C3, C4) constitute a hotspot corridor where poverty intersects with ethnic concentration of historically excluded indigenous communities (Yañez 2002). The remaining cluster in northern Oruro (C6), also inhabited by disperse rural communities (Crabtree and Chaplin 2013:50), likewise exhibits considerably low SDI values.

The very general cluster description has yielded several intuitive hypotheses that will be tested more sophistically in the previous section. According to the observed patterns, public service density appears to be associated with a) population density and b) with local economic productivity (for instance mining, hydrocarbon, agribusiness and commercial activities). In turn, low public service density appears to be associated with a) low population density, b) territorial inaccessibility, and c) low economic productivity (subsistence economy).

Before proceeding to the analysis of the actual determinants of the SDI, it is important to control for its temporal development. Reasonable statements on current public services levels must consider previous levels of state density.

As argued by the state formation scholars, path dependence is critical to understand the functional and territorial composition of the state (Mahoney 2010, Kurtz 2013, Soifer 2015). Therefore, it can be hypothesized that current public service levels in Bolivia might be to a large extent the product of an accumulative process of historical state formation. Hence, rather than understanding public service density as a contemporary snapshot, it should be regarded as sum or stock of previous density levels. Consequently, the SDI does not only measure contemporary state action but historical processes of state formation. All this implies to explore state and public service density in earlier moments in time. In the present case, census data availability allows computing the SDI with all its components for 2001 and a downsized version for 1992.

Table 8 presents the average values of the SDI 2001 and its variation compared to 2012 per Department, distinguishing per area (urban/ rural) and population size category. The variation between the national average value of the SDI 2001 (0.436) and the SDI 2012 (0.535) account for less than 0.1 points. This astonishingly small variation is even lower in the Departments of Santa Cruz (+0.09), Beni (+0.07), Oruro (+0.07) and Cochabamba (+0.05). The Departments with more notable, but still limited variations are Chuquisaca (+0.14), Potosí (+0.13) and Tarija (+0.13).

Table 7
Bottom 15 Municipalities with the Lowest SDI 2012

Rank	Municipality	Department	Category	Urb/Rur	SDI
325	**Carangas**	Oruro	A	R	**0.277**
326	**Tacobamba**	Potosi	B	R	**0.275**
327	**Charagua**	Santa Cruz	C	R	**0.275**
328	**Buena Vista**	Potosi	C	R	**0.256**
329	**Vila Vila**	Cochabamba	B	R	**0.254**
330	**San Pedro**	Pando	A	R	**0.254**
331	**Sena**	Pando	B	R	**0.249**
332	**Loreto**	Beni	A	R	**0.243**
333	**Cocapata**	Cochabamba	C	R	**0.238**
334	**Nueva Esperanza**	Pando	A	R	**0.234**
335	**Bolpebra**	Pando	A	R	**0.229**
336	**Santos Mercado**	Pando	A	R	**0.223**
337	**San Javier**	Beni	B	R	**0.211**
338	**Bella Flor**	Pando	A	R	**0.178**
339	**Exaltación**	Beni	B	R	**0.163**

Source: Own elaboration, data: INE Bolivia Census 2012.

Table 8
SDI Variations between 2001 and 2012 per Department

Department	SDI 2001	VAR (+)	Urb. VAR	Rur. VAR	Cat. A VAR	Cat. B VAR	Cat. C VAR	Cat. D VAR
Chuquisaca	0.357	**0.14**	0.04	0.14	0.16	0.15	0.10	0.04
La Paz	0.454	**0.11**	0.06	0.12	0.14	0.12	0.10	0.04
Cochabamba	0.491	**0.05**	0.01	0.06	0.04	0.08	0.05	0.01
Oruro	0.475	**0.07**	0.05	0.07	0.07	0.06	0.11	-0.03
Potosi	0.400	**0.13**	0.04	0.15	0.14	0.16	0.11	0.00
Tarija	0.508	**0.13**	0.06	0.17	NA	0.15	0.16	0.02
Santa Cruz	0.466	**0.09**	0.07	0.10	0.16	0.12	0.06	0.03
Beni	0.365	**0.07**	0.04	0.10	0.13	0.09	0.03	0.00
Pando	0.231	**0.12**	0.05	0.14	0.13	0.14	-0.05	NA
Bolivia	0.436	**0.10**	0.05	0.11	0.11	0.12	0.08	0.02

Source: Own elaboration, data: INE Bolivia Census 2001/ 2012.

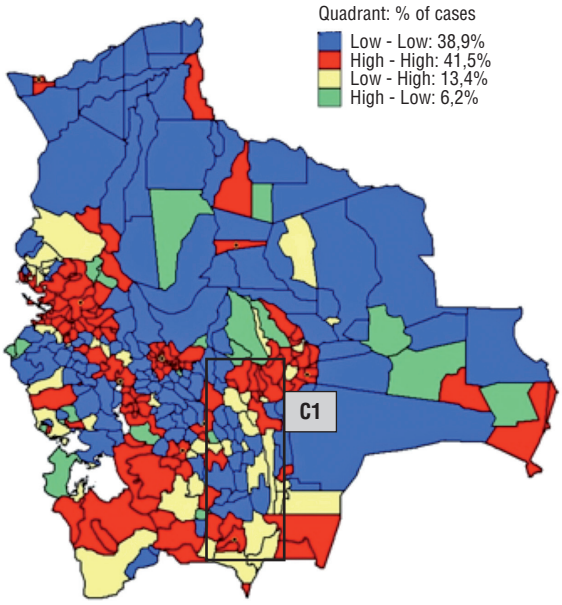
Separated by area and population size category, the SDI variations are almost insignificant in urban localities, particularly in those belonging to the category D (larger cities). In relative terms, SDI variations are perceivable in rural Municipalities of category A and B, especially in the Departments of Chuquisaca, Potosí and Tarija. The more pronounced variations in small rural localities are perhaps not that surprising, given the fact that public service improvements are generally more feasible to achieve in the low range segment. However, the generally small variation levels point to a relative stagnation of the basic public service provision in Bolivia between 2001 and 2012.

In order to detect temporal variations within the Departments it is helpful to return to cartographic methods. The following maps specify the relatively unaltered territorial distribution of public services between 2001 and 2012 (map 3) and also between 1992 and 2001 (map 4). As indicated by the quadrant information (value in 2001; value in 2012; number of Municipalities in %), the Municipalities that improved its relative SDI position (low-high) account for only 13.4 percent (yellow). Instead, the Municipalities that remained in their segment (low-low, high-high) make up more than 80 percent (blue and red). The improvements concentrate above all in the *Sub-Andino sur* (C1), hosting the major natural gas deposits.

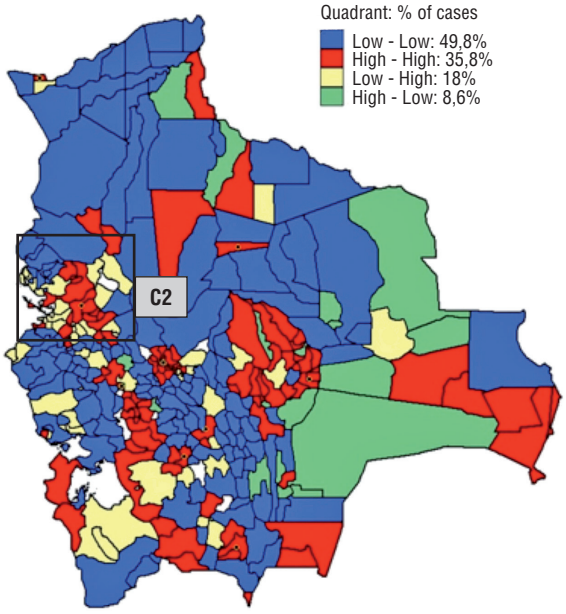
Also in the case of the SDI variations between 1992 and 2001, the group of improving Municipalities account for only 18 percent. Respectively, 86 percent of the Municipalities remain in their segments. Here, the SDI increase concerns especially the Municipalities surrounding the government headquarters in La Paz (C2).

Finally, the correlation calculation in graph 2 confirms the exposed stagnation tendencies, even when associating the values of 1992 and 2012. The correlation between the SDI values of 2001 and 2012 accounts for r= 0.83, respectively r= 0.69 for the SDI values of 1992 and 2012. These significantly strong correlations provide one central message: contemporary public service levels appear to be extremely well predicted by the public service levels of the previous two decades. More specifically, the relative distribution

Map 3
SDI Variations 2001/2012



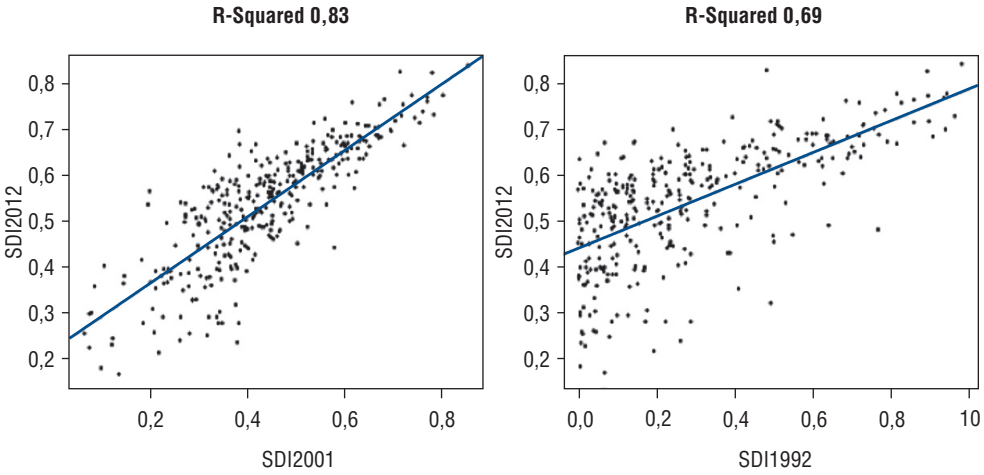
Map 4
SDI Variations 1992/2001



Source: Own elaboration, data: INE Bolivia Census 1992/ 2001/ 2012.

patterns of basic public services across the Bolivian Municipalities appear to remain largely unchanged since the 1990s. The municipalities that belonged to the highest public service segments, as well as the lowest ones, two decades ago, are also currently exhibiting significantly better service levels.

Graph 2
Correlation and Scatter Plots of the SDI 2001/2012



Source: Own elaboration, data: INE Bolivia Census 2001/ 2012.

This is a meaningful statement considering the extensive public policy reforms of the past decades. Bolivia has been not only considered one of the countries with the most rigorously implemented decentralization processes in the mid-1990s (Barrios-Suvelza 2005, Avilés 2005, Zuazo 2012, Faguet 2012), but has experienced a decade of progressive reform policies by the leftist government of Evo Morales (Crabtree and Chaplin 2013, Arze Vargas and Gómez 2013, Pérez Sáinz 2014, Farthing and Kohl 2014). In this context, the data presented provides a strong argument for reviewing the impact of these past reforms on public service patterns. As it seems, the origins of contemporary service variations must be sought in earlier historical periods.

4. Possible determinants of the identified public service patterns

Until now, the analysis explored the composition of the territorial public service patterns in Bolivia. The subsequent section focuses more on the underlying determinants of these variations. While there is already strong evidence pointing to rather long-term or path dependence explanations, it is indispensable to control for more current determining factors. Therefore, a comprehensive set of independent variables has been tested in a Spearman's correlation in regard to its association with the dependent variable, the SDI Bolivia 2012. The variables derive from six dimensions, commonly identified as relevant in the literature.

The first dimension comprises historical legacy variables, more precisely the calculated precursor SDI's for 1992 and 2001. Based on the mentioned state formation literature (for instance Mahoney 2010, Kurtz 2013, Soifer 2015) and the previous observations, both variables are expected to display a positive association with the SDI 2012.

The second dimension covers potential determinants related to the local economy. In order to control for a possible association between the SDI and specific economic activities, the local GDP per Municipality - including its sector disaggregation (primary, secondary and tertiary sector) - has been calculated. Therefore, regional accounts data from 2012 (cuentas regionales) has been combined with the 2012 census data. Following the literature, especially industrial and tertiary economy is assumed to impact positively on public service levels due to its positive effect on local wages and urbanization levels, which in turn tend to improve the provision conditions (i.e. economies of scale) (Wilensky 1975, Tsai 2007, Huber and Stevens 2008, Rodrigues-Silveira 2012).

The third dimension controls for local institutional and fiscal characteristics. Using fiscal data from the Ministry of Finance, the municipal income as well as the local human resource spending on behalf of the central government has been calculated for each Municipality.[6] The income calculation further distinguishes between properly generated revenues and central state transfer payments.[7] Fiscal spending is captured by the total budgeted expenditure amounts (summed running and investment costs) and the disaggregated budgeted amounts per public service field of interest (health, education, electricity and sanitation). All fiscal indicators are standardized as per capita value while using an average data calculation from 2010 to 2012. In order to measure local institutional capacity, the percentage of the actual municipal budget spending, the number of local civil servants and the continuity of the local Mayor in office (2004-2012) have been calculated. In addition, the municipal governance index, IGM (Indice de Gobernabilidad Municipal 2005–2009), elaborated by the Ministry of Autonomy (Ministerio de Autonomías 2010) has been incorporated in the data set.[8] The effect of fiscal income on public service provision is expected to be positive in the case of properly generated income (Weingast 2006, Wallis and Wallace 2010, Faguet et al. 2014) and negative in the case of fiscal transfers (Rodden 2003, Gervasoni 2010). Fiscal expenditure budget spending and the institutional capacity are assumed to be

6 Due to the lack of locally disaggregated central government spending information, I combined existing data on central government human resources spending per Department (*Presupuesto General del Estado* 2011) with the 2012 census data, calculating the average central government spending for each health and education worker per Municipality.

7 I specified the three major transfers, which are assigned to the Municipalities according to different distribution logics. The financially most important transfer is the *Impuesto Directo a los Hidrocarburos (IDH)*, which is distributed according to a specific formula (see Just Quiles 2013). The second most important transfer is the coparticipación transfer, which is distributed according to a strict per capita criterion. The third transfer is the HIPIC payment, which is distributed to the poorest Municipalities (for more details see SEA 2012).

8 The *Municipal Government Index* comprises fiscal efficiency, civil participation, government accountability, political stability and efficiency of government control mechanism (see Ministerio de Autonomías 2010).

positively correlated with the SDI. Likewise, local government continuity is expected to be positively associated with the high public service levels (Pribble 2015).

The fourth dimension comprises political and civil society variables. In order to control for the association between service provision and party politics, democratic participation as well as political competition, the calculation incorporates the political affiliation of each Municipal government to the ruling party (official party or opposition party) and the level of democratization - here measured using the Vanhanen Index (Vanhanen 2000), properly calculated for 2004.[9] According to the literature, public service provision is expected to be higher in Municipalities which are ruled by the national or departmental government party due to possible distribution coalitions or preferential treatment (Khemani 2003, Sengupta 2007). Likewise, where democratization reaches high levels, service outputs are expected to be higher because of the increased accountability and responsiveness of local governments (Lake and Baum 2001, Adserà et al. 2003, Faguet 2012).

The fifths dimension includes demographic features. The operationalization comprises local population size, the local population density and the local urbanization rate.[10] Further, the calculation accounts for the population growth between 2001 and 2012, the share of indigenous population in a Municipality and the ethnic fractionalization.[11] The first group of variables is anticipated to have a positive effect on the SDI because of the associated economies of scale and density effect (Ladd 1992, World Bank 2009:181), which generally reduces the public sector costs (Downing 1977, Wildasin 1986). The second group is assumed to be negatively correlated with public service provision due to conflicting preferences and resulting collective action problems (Alesina et al. 1999, Miguel and Gugerty 2005, Akramov and Asante 2009).

The sixth dimension covers selected geographical variables. Physical aspects of geography are operationalized by the Municipality size in square kilometers and the distance of the municipal capital to the respective regional capital in hours. Both, size and distance are assumed to have a negative effect on the SDI. Following the literature, these variables are associated with increasing service provision costs, lower service accessibility (*distance decay-effect*) and more limited flow of information and resources from political and economic centers (Pinch 1997, Akramov and Asante 2009, World Bank 2009, Pierskalla, Harbers 2014).[12]

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9 The *Vanhnanen Index* measures the level of electoral participation (% of total population) and the party competition degree (voter difference between first winning to second winning party) (Vanhanen 2000). The indicator has been calculated with data from the municipal election of 2004. The government affiliation has been calculated with national election data from 2009 and departmental election data from 2010.

10 Population density is calculated by dividing the total population of a Municipality by its geographic size. In contrast, urbanization rate expresses the percentage of urbanized communities in a Municipality. Data has been used from the 2012 census.

11 Ethnic fractionalization measures ethnic diversity. For measurement issues see Miguel Centellas (2015).

12 Other discussed geographical variables such as terrain roughness, tropical climate and natural resource deposits have been excluded from the data set (for a discussion see Gallup 2000, Mitton 2015).

Table 9 reports the respective correlation results. As expected, previous levels of state density are highly correlated with the contemporary service provision. Local GDP exhibits a small correlation, although the sector decomposition provides way more meaningful insights: agriculture is negatively associated with the SDI while the industrial and the administrative sector display medium positive correlations. The service sector share presents the highest positive association, fulfilling the formulated assumption. In turn, the share of the extractive is only slightly associated with the public service provision.

The set of institutional variables offer the most unexpected insights. Indeed, own revenue generation displays a positive medium correlation with the SDI while transfer payments are generally negative one. However, only the HIPIC payment is strongly correlated - very possibly because this payment is assigned to the poorest and less developed Municipalities which also score low in SDI terms. The correlation between the largest transfer programs, the IDH payments, remains small. The association between the SDI and municipal budget spending surprises by its continuously small and especially negative manifestation. While reverse causality might be at work (because the service density is low, Municipalities need to assign more resources), the generally small effect size indicates to the limited explanatory value of the fiscal budget allocation. Even the actual budget spending displays a slight negative association. The only notable medium correlation pertains to central government spending. Interestingly, the entire set of institutional capacity proxies does not exhibit notable associations at all.

Table 9
Correlation between SDI 2012 and the Independent Variables

Indep. Variables	SDI 2012	Indep. Variables	SDI 2012
SDI 1992	**0.69*** **	Mun. Expenditure (sanitation)	-0.02
SDI 2001	**0.83*** **	Mun. Budget Spending	-0.12**
Local GDP	0.27***	C. Gov. Spending (health+edu.)	0.32***
Sector GDP Agriculture	-0.45***	Contin. Stakeholders in office	-0.09
Sector GDP Extract. Res.	0.11***	N° Local Civil Servants	-0.04
Sector GDP Industries	0.34***	Mun. Governance Index	0.09
Sector GDP Services	**0.64*** **	Local Gov. Affiliation (nat.)	-0.15***
Sector GDP Publ. Adm.	0.39***	Local Gov. Affiliation (dep.)	-0.07
Mun. Income (total)	-0.14**	Democratization (Vanhanen)	0.46***
Mun. Income (own)	0.32***	Local Population Size	0.24***
Mun. Income (transfer- IDH)	-0.2***	Local Population Density	**0.56*** **
Mun. Income (transfer- Copart.)	0.0002	Local Urbanization Rate	0.44***
Mun. Income (transfer- HIPIC)	**-0.53*** **	Local Population Growth	0.01
Mun. Expenditure (total)	-0.15***	Share of Indigenous People	-0.23***
Mun. Expenditure (health)	-0.06	Ethnic Fractionalization	0.14**
Mun. Expenditure (education)	-0.12**	Size of Municipality	-0.41***
Mun. Expenditure (electricity)	-0.25***	Distance to regional capital	-0.38***

Source: Own elaboration; Significance test: ***p<0.01 ** p<0.05; Effect size interpretation according to Cohen (1988): r= 0.1 small; r= 0.3 medium; r= 0.5 large.

Political processes and society features display small to non-existing correlations with the SDI 2012, except for the democratization variable. The local government's party affiliation seems to be irrelevant in service provision terms. Municipalities ruled by the official government party MAS display even a slightly negative association. In turn, democratization provides a medium correlation, apparently confirming the assumed positive (Faguet 2012).

Contrarily to the two previous variable groups, the set of demographic characteristics displays more coherent results. While population size presents a rather small positive correlation, the two population density measures expose significantly strong effects in relation to contemporary public service levels. Indigeneity displays a negative but rather small effect. Ethnic fractionalization and population growth in turn do not show significant correlations.

Finally, the geographical variables are constantly significant and conclusive. The geographical size of a Municipality is negatively associated with SDI. Likewise the distance indicator as proxy for geographical remoteness is also negatively correlated. Hence, in line with the existing literature, the larger a Municipality and more distant to a regional capital, the lower appears to be the basic service provision output.

In sum, the correlation calculation provides meaningful insights regarding the probable SDI determinants. Structural variables related to the local economy, demography and geography appear more associable with the contemporary local public service variation in Bolivia. In turn, institutional aspects as well as political features appear less informative when tracing the causes of local service disparities. The most significant correlations, however, are displayed by the historical legacy variables, namely the state density levels of 2001 and even of 1992. Hence, the initial assumption that the current service variations in Bolivia may result from a more accumulative process of historical state formation, once again gained supporting evidence.

Elsewhere, the author tested these results in a more sophisticated multiple regression analysis, controlling for the precise effects and causal relationships of the stated variables (Just Quiles 2017). These pursuing statistical operations point into the same direction, highlighting the primacy of historical legacy and structural local context features over more institutional and political determinants. Returning to the initial question regarding the effect of the latest natural resource boom on the territorial distribution of public services, the correlation results might provide the respective answer. Considering the negligible correlation coefficients between the SDI 2012 and the chosen fiscal variables, latter appear to have almost no effect on the public service distribution. Hence, it can be assumed, that the latest commodity boom has had only marginal balancing effects – probably only in the gas-producing Municipalities – on the local public service variations in Bolivia between 2001 and 2012. Instead the results suggest considering more durable formation processes of the context features, such as local economy and urban development when seeking to explain the consolidation of contemporary public service inequalities across the Bolivian Municipalities.

5. Conclusion and Outlook

This paper explored the local variations of basic public service provision in Bolivia between 2001 and 2012. Despite the very favorable state income situation in this commodity

boom period, the analysis detected a distinctive persistence of significant territorial inequalities in the provision of basic public services between the Bolivian Municipalities. Using statistical methods - particularly indicator development, descriptive statistics and correlation calculation - the analysis showed in particular that the relative territorial distribution patterns of the selected public services remain largely unchanged since the early 2000s and even since the 1990s. That is, the municipalities that belonged to higher public service segments, which were lower two decades ago, are also currently exhibiting significantly better, service levels. As a matter of fact, between 2001 and 2012 less than 20% of all the Municipalities transitioned into a significantly higher quintile position, respectively only 18 percent between 1992 and 2001. These statistical results support the assumption, that the unprecedentedly large public investment initiatives by the central government in the past decade have had only a marginal balancing effect when focusing on the territorial public service inequalities across the country.

In order to identify the reasons behind this relative distribution stagnation the document explored the drivers of public services at the local level. The applied correlation analysis revealed the predominant role of local context features, such as local economy and demographic characteristics, which appear to affect public service development more heavily than local institutional and fiscal capacities. It is in particular the population density and the share of the tertiary economy – both features of urban development – which are positively correlated with the public service provision. Furthermore, previous public services levels in a Municipality appear to condition the more current service levels. This evidence suggests that public service provision should be regarded as an accumulative product of more durable formation processes.

This insight might explain the apparently limited effect of the latest revenue bonanza on the territorial patterns of public service inequality. While more cyclical dynamics, like fiscal shocks or public policy initiatives, might have a positive effect on public service structures, these dynamics will be very likely controlled by the operating force of more structural determinants. While it is certainly true that these structural factors, like economic or demographic context features, might change as a consequence of cyclical dynamics, they generally appear more enduring and self-reproducing over time. This perspective might help to better understand the observed persistence of contemporary public service inequalities in Bolivia.[13]

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Multidimensional poverty in Ecuador. A spatial analysis

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Abstract

This document analyzes the spatial scope of multidimensional poverty in Ecuador. The objective is to determine the existence of a mutual spatial dependence between different geographic sectors of the country and their variation over time. The geographical unit of analysis is the canton (municipality), for each of which the Multidimensional Poverty Index (MPI) and the Multidimensional Poverty Rate (MPR) were calculated using data from the Population and Housing Census for the 1990s. 2001 and 2010. Among the main results reported, the spatial autocorrelation of the poverty indicators for the analyzed three years, is significant and positive in nature, which implies that poverty at the cantonal level is linked to the behavior of this phenomenon in its neighboring municipalities, showing a higher level of dependency in 2010. Likewise, it is possible to determine the probable conformation of poverty conglomerates. On the other hand, there is evidence of a reduction in poverty at national level throughout the analyzed periods. This decrease in poverty is due to factors such as the expansion of service coverage and improvements in educational attainment.

Keywords: Multidimensional Poverty Index, spatial autocorrelation, Moran Index, Ecuador.

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1. Introduction

Poverty, as well as its causes and consequences, have been the subject of several studies by social science researchers and governmental institutions in all countries of the world, and especially in developing countries. Also the way of analyzing it, has been evolving through the contributions of various authors and the easiness of techniques which have allowed to study it.

Ecuador in the last 20 years has presented a gradual decrease of the different indicators of poverty[2], however these achievements have been heterogeneous in the different subnational levels that make are part of the country.

The problem of the spatial heterogeneity of poverty is one of the aspects that has caused the growing interest of policymakers and government entities (Henninger and Snel 2002 and Petrucci et al., 2003). In the case of poverty, heterogeneity refers to the fact that the poor population is concentrated in specific geographic spaces, representing poverty circles that are difficult to combat with traditional policies.

Two aspects to highlight within the aforementioned have to do with the use of a multidimensional poverty criterion; and second, with the geographic analysis linked to social dynamics, that is, if the spatial environment is an interacting factor within the problem of poverty analyzed. What is intended with this work in the Ecuadorian case, for which it has been organized as follows: section 2 describes the background, methodology and data. Section 3 presents the results of the poverty and spatial concentration indices; and, in the last section, some conclusions and policy implications are exposed.

2. Background, Methodology and Data

2.1 Background

The Republic of Ecuador has 16.5 million inhabitants, divided into four geographical areas: Coast, Mountain range, East and Insular Region; and with a territorial division composed of 24 provinces, 221 districts (cantons) and 1228 parishes, which show marked inequalities. According to the VII Population Census and Housing VI (2010), the ten most populated cities account for nearly half of the total population, while only two cantons, Quito and Guayaquil, generate around 45% of the National Value Added (Central Bank of Ecuador, Cantonal Accounts 2015).

Ecuadorians have historically suffered high rates of poverty and inequality, as the result of economic and social instability and a high dependence on oil (SENPLADES and SETEP 2014). The economic and social heterogeneity at various geographical levels of analysis still persist (Mendieta Muñoz and Pontarollo 2016). In particular, the incidence of poverty by income for the year 1990 reached 65.3% and for 2010 33% (SIISE, consultation 2017). Despite an apparent achievement in recent years, this decline has not been homogeneous

2 Poverty by income, by consumption, unsatisfied basic needs, Human Development Index, Multidimensional Poverty Index.

throughout the territory. Thus, limitations persist in access to basic services, to decent housing, problems in educational attainment, etc., which affect specific places and certain ethnic groups in particular (SENPLADES 2009, 2013a, 2013b).

The efforts to reduce poverty in Ecuador have been constant, taking a relative connotation since 2007. Since then, the Central Government has proposed the "National Plan for Good Living" with twelve general objectives aimed at addressing national needs and promoting economic and social justice.

Objective 2 says "Sponsor equality, cohesion, inclusion and social and territorial equity, in diversity", seeking to address the problems of poverty and inequality from a multidimensional perspective. Among the policies to achieve this objective is the identification of groups in situations of vulnerability and poverty in order to improve the efficiency and effectiveness of public policies. (SENPLADES 2013). In effect, important goals were achieved within these objectives in the last decade, for which the high oil prices were fundamental, since they allowed doubling social spending, considerably increasing the investment in infrastructure, salaries and subsidies of the public sector (BTI 2016).

2.2 Methodology

In this article, the Multidimensional Poverty Rate and the Multidimensional Poverty Index are calculated for the years 1990, 2001 and 2010 at the cantonal level. In a second moment, it is inquired about the existence of spatial correlation of the different indices.

Recognizing that poverty has multiple components, Alkire and Foster (2007) propose a methodology for its multidimensional measurement (AF method), integrating several elements that reflect the different deprivations that characterize this phenomenon in the different levels of disaggregation. The construction of the Multidimensional Poverty Index (IPM) follows the same steps as the one-dimensional measurement, that is: the identification of the poor and aggregation through the construction of the index.

In order to carry out the process of identifying the poor, an intermediate cut-off criterion of deprivation is used to avoid falling at the ends of union and intersection; that is, define a minimum number of dimensions k for which people are classified as poor or non-poor, and that in turn consider cut-off lines within each dimension, and between them (Alkire and Foster 2007).

After the identification of the poor, it is necessary to carry out the aggregation through the construction of an index, using the Foster Greer Thorbecke family of indicators (FGT indicators). The first indicator is the adjusted count rate, whose expression is given by:

$$M_0 = H \, X \, A \qquad (1)$$

Where H is the counting rate, and A is the average of the proportion of deprivation among the poor. This average can be expressed as:

$$A = \frac{|c(k)|}{qd} \qquad (2)$$

Being c (k) the censored table of deprivation counts, q the number of people identified as poor, and d is the number of dimensions contained in the IPM.

The definition of the number of dimensions should seek the selection of a number that is broad enough to cover the multiple facets of poverty, and at the same time that does not fall into an excessive set of indicators that lose the sense of measurement. Certainly this definition within each country depends in turn on several practical restrictions such as the availability of information, social situation, politics, and other factors. In the Latin American context, several countries have opted for a multidimensional measurement of poverty. Colombia, for the determination of the number of dimensions, made a wide consultation with experts and academics in the matter. Similar with Chile, which formed a commission of experts within civil society. While countries as Mexico and Ecuador, defined their dimensions and indicators protected in the principles of their Constitution (Zavaleta and Angulo 2017).

In this investigation we worked with the census information of the years 1990, 2001 and 2010, which made it impossible to work with all the indicators proposed by the National Institute of Statistics and Census of Ecuador (INEC), but it was kept the consideration of the four dimensions proposed by this official organzation (Table 1).

Table 1
Dimensions and Indicators of the IPM and the TPM

Dimension	Money (%)	Indicator	Threshold
Education (25%)	(25/2)	1. Absence of basic education and high school	Children from 5 to 14 years of age who do not attend a basic education center are considered deprived to the right to education, as well as young people between 15 and 17 years of age who do not attend High School.
	(25/2)	2. Incomplete educational achievement	People between 18 and 64 years old, who do not have the access to education, and have not finished basic education, that is, who have less than 10 years of schooling and who do not attend a formal education center.
Work (25%)	(25/2)	3. Child employment	All children between the ages of 5 and 14 who are employed in the reference week, identify themselves as deprived when child labor is considered prohibited.
	(25/2)	4. Unemployment or inappropriate employment	Persons 18 years of age or older who in the reference period were unemployed are considered to be deprived of their right to work.
Economic dependence and water (25%)	(25/2)	5. Economic dependence	The head of the household has 2 or less years of schooling and the relation between the number of people at home and the number of recipients is greater than three
	(25/2)	6. No water service by public network	Members of households that obtain water by means other than the public network are identified as deprived.

Dimension	Money (%)	Indicator	Threshold
Habitat and Housing (25%)	(25/3)	7. Overcrowding	They are in overcrowded condition, the members of dwellings that have on average more than three people per exclusive bedroom to sleep.
	(25/3)	8. No sanitation of excreta	People in the urban area whose housing does not have a toilet service connected to the sewage system. In the rural area, deprived persons are those whose dwelling does not have sewage or septic tanks.
	(25/3)	9. No garbage collection service	People who live in homes that do not have access to the municipal garbage collection service, are classified as deprived in this indicator.

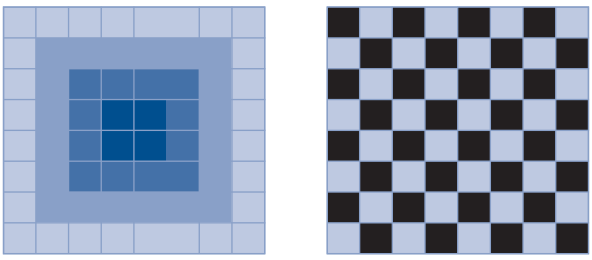
Source: Ecuadorian Institute of Statistics and Census Elaboration: The authors.

On the other hand, one of the topics on the rise of the regional economy is the exploratory analysis of spatial data (ESDA for its acronym in English). Anselin (Cited by Pérez 2006, 136) defines the study of spatial correlation as "the existence of a functional relationship between a given point in space and what happens in any other", which implies a conditioning between the value of a variable and its magnitude in a neighboring region. This situation can be seen mathematically reflected as:

$$\text{dado} \quad y_i = f(y_j),\ i = 1, \ldots\ldots, n, j \neq i$$
$$Cov[y_i, y_j] = \mathrm{E}[y_i y_j] - \mathrm{E}[y_i] - \mathrm{E}[y_j] \neq 0, \textit{para } i \neq j \qquad (3)$$

Where an observation corresponding to a region *i* is related to the observation of region *j*, expressing itself by the conditional moment of the covariance between those regions. The autocorrelation will be of a positive nature when the presence of the phenomenon analyzed in a given unit extends to the adjacent units, but with a decreasing effect. While the autocorrelation will be negative when the possibility that the analyzed phenomenon occurs also in the neighboring regions is diminished. A graphic representation can be assimilated to the distribution of the squares of a chessboard.

Figure 1
Forms of Autocorrelation



Autocorrelation positive Autocorrelation negative

Source: Baronio, Rabanal and Vianco 2012.
Elaboration: The authors.

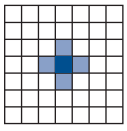
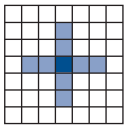
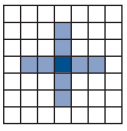
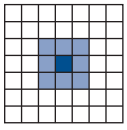
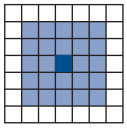
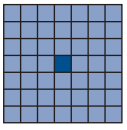
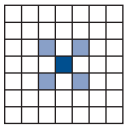
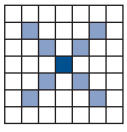
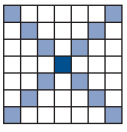
Moreno and Vayá (Cited by Baronio, Rabanal and Vianco 2012, 6) point out that when considering an analysis of cross-sectional data, it is necessary to construct a matrix that collects the multidirectional relationships that the observations can have with each other, this matrix is called the matrix of space weights, contact matrix or spatial proximity matrix (W). This matrix is of order $n \times n$, and each of its elements w_{ij} reflects the intensity of the interdependence between each pair of regions.

Tobler's first geographical law states that "everything is related to everything else, but the closest things are more related than distant things" (Cited by Acevedo and Velasquez 2008, 14). This leads to the impact that the geographical area and the concept of distance may have on the dynamism of social and economic factors in the territory. Mendieta and Pontarollo (2015, 5) highlight the wide range of alternative definitions of distance, which can be classified into three main categories:

- Physical distance: based on the geographical characteristics of a territory.
- Socioeconomic distance: based on cultural and economic characteristics.
- Mixed physical-socioeconomic distance: based on the weighted combination of the two previous concepts.

The contiguity between regions can be represented analogously to the movement of chess pieces, using three main criteria: rook matrix (tower), queen matrix (queen) and bishop matrix (bishop). The number of spatial delays is given by the number of physical contacts that each region has, being the first order delay the one which corresponds only to the direct contact between regions, whereas a second order delay implies that each region is also related to the adjoining regions of its neighbors, and this way in a progressive manner for a higher order criteria.

Figure 2
Contiguity Criteria

	First order spatial delay	Second order spatial delay	Third order spatial delay
Matriz rook			
Matriz queen			
Matriz bishop			

Source: Baronio et al. 2012.
Elaboration: The authors.

The spatial autocorrelation can be collected, among others, by the Moran Index, which is used primarily in area data. Being $x_1, \ldots, x_n$, and the variables measured in the n areas. The presence of spatial autocorrelation is given by the criterion that the values observed in adjacent geographic areas will be more similar than expected under the assumption of spatial independence (Giraldo 2011). The Moran index is defined as:

$$I = \frac{n}{S_0} \frac{\sum_{ij=1}^{n} w_{ij}(x_i - \bar{x})(x_j - \bar{x})}{\sum_{i=1}^{n}(x_i - \bar{x})} \qquad (4)$$

With $i \neq j$, where x_i represents the value of the quantitative variable x for region i, n is the sample size, w_{ij} represents the spatial weights of the contact matrix W, and S_0 is the sum of the spatial weights.

Likewise, the analysis of local spatial autocorrelation is aimed at the detection of agglomerations (clusters), which is not possible with global spatial association measures. This implies that although global contrasts have detected a certain scheme of spatial autocorrelation, this may not be maintained for the entire sample (Baronio et al 2012). Whereas, the local analysis examines particularly sub-regions where it is determined if said area represents clusters of high values (Hot spot) or low values (Cold spot) (Getis and Fischer 2009).

The expression of the Moran statistician is given by:

$$I_i = \frac{Z_i}{\sum_i \frac{Z_i^2}{N}} \sum_{j \epsilon J_i} w_{ij} Z_j \qquad (5)$$

Where Z_i is the value of region i for the normalized variable, and J_i represents the set of regions neighboring i. The Moran statistic meets two requirements: on the one hand, it quantifies the degree of significant grouping of similar values around an observation, and also complies that the sum of the indicator for all observations is proportional with the global indicator of spatial association (Baronio et al. 2012).

2.3 Data

The data for the present study comes from the Population and Housing Census for the years 1990, 2001 and 2010 prepared by the Ecuadorian Institute of Statistics and Census (INEC). It provides information on the main demographic and social aspects of the population. The main advantage of the census is its universality, since it covers the entire territory at the census sector level and includes all persons who are present or who reside in the territory. Being a comparative cross-sectional study, it is necessary that the questions are the same in the three periods of study, which causes that nine comparable indicators can be constructed. Therefore, the results obtained are not similar to the official results, given that they calculate the poverty indices with twelve indicators, which causes their results to indicate a higher poverty rate and a higher multidimensional poverty index.

The administrative political division of Ecuador used was that of 2010. The regional evolution throughout history has been marked by the de-concentration of the population of the Sierra towards the Coast, particularly due to agricultural opportunities and proximity of ports; and the population growth in the Amazon since 1972, motivated by the start of oil production in the area (Cebrian, 1999).

From 1990 to 2010, the period in which the three Population and Housing Censuses were carried out, the administrative political division of Ecuador has gone from 21 to 24 provinces, and from 169 to 221 municipalities or cantons.

Table 2 presents a summary of the set of indicators used to calculate the Poverty Rate and the Multidimensional Poverty Index, applying the thresholds above described, to identify deprived persons in the analysis dimension.

Table 2
Deprivation indicators

Indicators	1990	2001	2010
Absence of basic education and high school	38%	27%	13%
Incomplete educational achievement	81%	78%	56%
Child employment	8%	6%	3%
Unemployment or inappropriate employment	4%	8%	8%
Economic dependence	16%	12%	7%
No water service by public network	45%	34%	29%
Overcrowding	47%	38%	26%
No sanitation of excreta	63%	55%	23%
No garbage collection service	59%	39%	24%

Source: Population and Housing Censuses.

All the indicators show significant reductions over time, however, there are certain dimensions that show that there are still considerable proportions of people reporting deprivation.

On the other hand, the results obtained at the national level have not been homogeneous throughout the country, such is the case of the Canton Aguarico located in the province of Orellana belonging to the East, where 32% of children and young people do not attend basic education, compared to 13% national. Likewise, the cantons with the highest productive concentration are the ones with the least deprivation, these are Quito, Guayaquil and Cuenca.

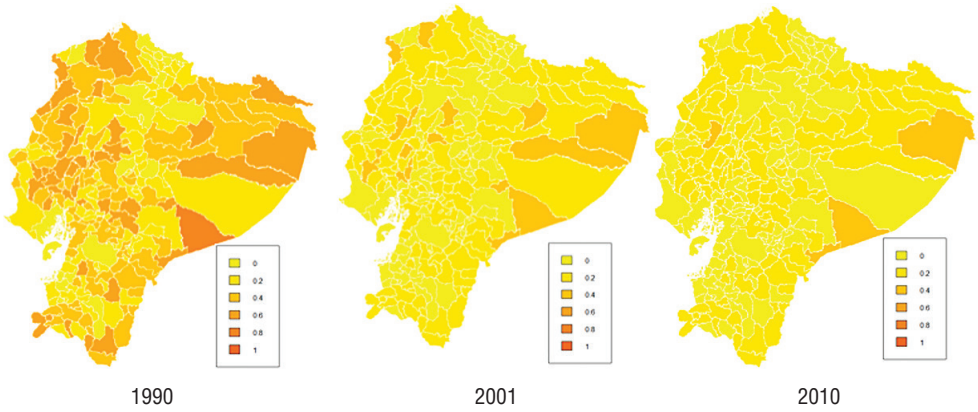
3. Results

The unit of analysis chosen for calculating the rate and the multidimensional poverty index is the household. That is, deprivations are experienced simultaneously by the people who make up a home and not by isolated people. For example, if a deprivation corresponds to uneducated children, this deprivation would not only characterize the child who

experiences it but the entire household. The reading is as follows: a household that has a child who does not attend classes is considered a home in deprivation; or seen otherwise: all individuals who live in a home that has a child without education are considered in deprivation.

There is no deterministic method to define the cut-off point for the identification of poor households, that is, the value of the parameter k. Following Lopez Calva et al (2009) who use a $k = 2/6$ and Alkire and Santos (2010) who take a $k = 3/10$, in the present study a $k = 3/10$ is used.

Figure 3
Multidimensional Poverty Index at Cantonal level



Source: Population and Housing Censuses.
Elaboration: The authors.

The multidimensional poverty rate for the year 1990 reached 60%, for 2001 it was 48%, and for 2010 it was 28%, while the multidimensional poverty index was 0.33, 0.15 and 0.13 respectively for those years. The reduction of approximately two percentage points in the MPI during the last ten years shows that the proportion of deprivation among the poor has not decreased significantly. This indicator reflects the intensity of poverty, that is, poor households on average face the same proportion of deprivation for 2001 and 2010.

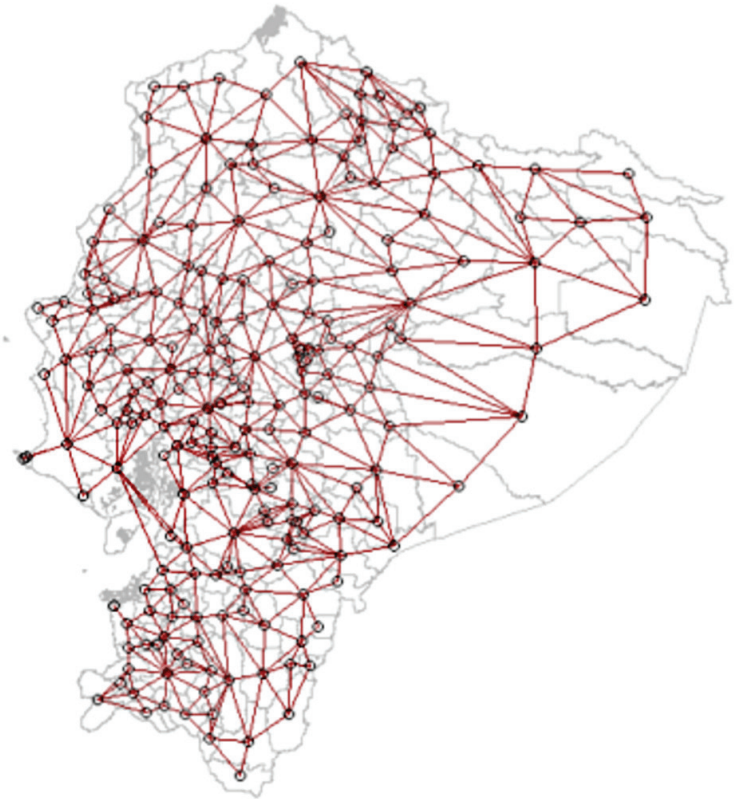
The light colors on the map in Figure 3 show the cantons with a population with lower percentages of multidimensional poverty index, while darker cantons show the cantons with higher indices. In this way it is possible to identify a clear heterogeneity of poverty in Ecuador, as well as a clear concentration in certain geographical areas.

According to the MPI, the areas with the highest poverty values are located in the East, in the three periods of study, in the provinces of Sucumbíos, Napo and Morona Santiago. In addition, you can also find areas of high poverty on the coast between the provinces of Manabí, Los Ríos and some cantons of the province of Guayas. On the other hand, the spatial units with the lowest incidence of poverty are found in the cantons: Cuenca, Azogues, Tulcán, Machala, Guayaquil, Ibarra, Loja and particularly Quito, where the IPM is 0.026 and the TPM reaches 6.63% , much below the national value.

This first result shows that the spatial distribution of poverty measured by the MPR and MPI does not behave in a random way, but on the contrary, there is some kind of spatial dependence between the cantons.

Once the IPM has been calculated at the level of each of the spatial units, an analysis of spatial dependence between them is carried out. For this, the initial matrix of contacts used is of the binary type, where 1 implies that two units are neighbors, and 0 the absence of neighborhood between pairs. Additionally, the contiguity criterion is the geographic "queen" of first order, where two geographical units are neighboring if they have a common border point (Figure 4).

Figure 4
Connections map

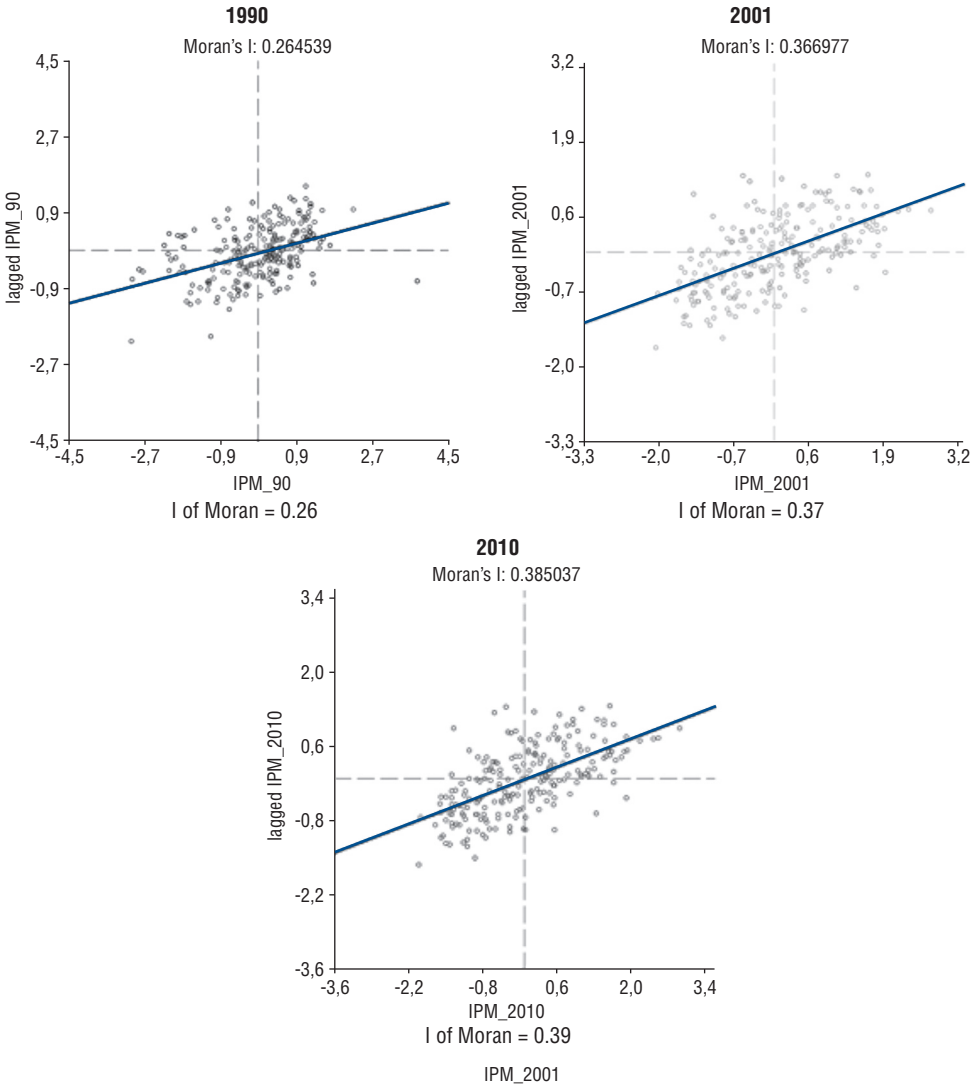


Source: INEC Cartography.
Elaboration: The authors.

To measure the global autocorrelation, the Moran I statistic is used. Originally developed by Moran (1948), said autocorrelation has been applied in different contexts Cliff and Ord (1981), Anselin (1996), Amarasinghe et al. (2005), Pinkse (2003), Griffith (2003) and Palmer-Jones and Sen (2006).

The global Moran I statistic raises in its null hypothesis the random distribution of observations in space. In 1990, the calculated value is 0.26 (p-value <0.001), which is why there is a positive spatial relationship at the cantonal level of the MPI; that is to say, that the degree of poverty of a canton depends not only on its own conditions, but also on the dynamics of poverty of its neighbors. For the years 2001 and 2010, the statistic increases its value to 0.37 and 0.39, respectively; which shows that not only mutual dependence is maintained, but that this relationship has increased throughout the three periods analyzed (Figure 5**).**

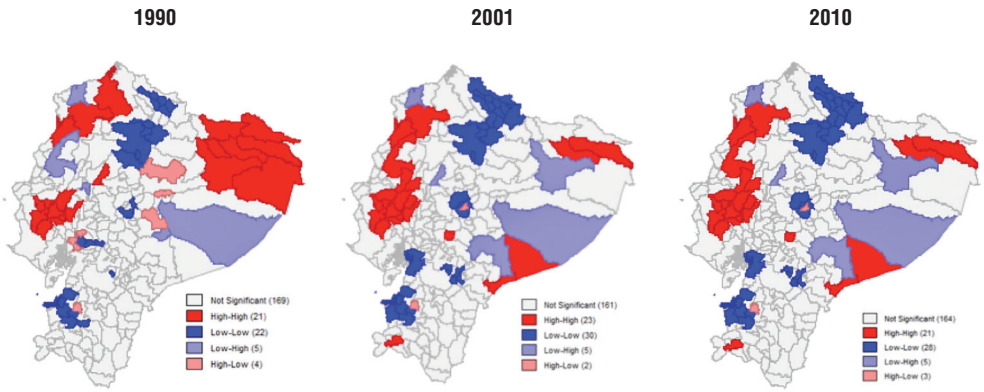
Figure 5
Moran Plot



Elaboration: The authors.

Taking into consideration that the Moran global index does not allow the detection of local grouping patterns, it is necessary to calculate an indicator that allows analyzing this situation. Therefore, we proceed to find the local Moran index, which is obtained for each spatial unit.

Figure 6
Moran Plot



Elaboration: The authors.

The local Moran indicator represents the degree of correlation of poverty calculated for each canton with the indicators of its neighbors, identifying the areas where similar values are grouped (high - high, or low - low); and in turn areas with dissimilar values (high - low, low - high). The conformation of high - high type conglomerates are located particularly in the coast, between the provinces of Esmeraldas, Los Ríos, Manabí and Guayas. While from 1990 to 2010 there is a partial disintegration of conglomerates of high poverty in the Northern part of the Amazon. The conformation of a conglomerate of low - low type occurs mainly in the North of the Sierra, between the provinces of Pichincha, Imbabura and Carchi, as well as also between the southern parts of the coast, in the province of El Oro. Finally, the cantons with dissimilar association of high - low, and low - high type are relatively small (9 in 1990, 8 in 2001 and 7 in 2010) and are found in the three regions of the country (Figure 6).

4. Conclusions

This article uses information from the last three censuses conducted in Ecuador to calculate, identify and analyze the spatial patterns of multidimensional poverty at the cantonal level in Ecuador. The Moran Index is generated and used to test spatial autocorrelation and prepare maps that demonstrate the clustering of poverty at the local (cantonal) level. The results show a decrease in poverty rates over the last 20 years, but they also show the creation of poverty clusters (See Annex 1).

The positive correlation of the I of Moran, shows that the poor cantons are surrounded by other poor cantons, and that the rich cantons are surrounded by the rich. This could be the result of correlations in the natural endowments of factors, externalities or a combination of both.

Despite the decrease in the number of people living in poverty, the spatial distribution, as well as the multidimensional poverty index in certain coastal areas of the country, still remain high. Thus, for the year 1990 the coastal provinces had an MPI of 0.55 on average, for 2010 these areas maintain an MPI of 0.31, still well above the national average, which for that year reached an index of 0.13. That is, the poor are not distributed evenly throughout the territory. The sierra (mountains range areas) has the least poverty in relation to the total population.

Therefore, poverty eradication policies must take into account the spatial distribution of poverty. In addition, the largest number of poor people are in the cantons that form the "hot spots" of poverty, so for the year 1990 the proportion of poor people who were in the conglomerates "hot spots" (High-High) was 12% , that proportion is higher in the year 2001 (13%), but for the year 2010 the concentration of poverty increases in those places (17%) showing that the number of poor increases.

The analysis suggests that localization is an important factor to be considered in analyzing poverty, so cantons with high rates of poverty are more likely to be found in the eastern provinces. This could be due to reasons such as less access to education, access to services and housing conditions that are heterogeneously distributed throughout Ecuador.

Therefore, the deprivation in the dimensions of housing and education still affects a large number of Ecuadorians. The problems in relation to housing are linked above all to quality, which means that it is necessary to implement public policies to increase the coverage of basic services (especially drinking water, sewerage and garbage collection). (Mideros, 2012)

Poverty is more concentrated in the Coastal and Eastern provinces, where better policies and greater economic resources are needed due to heterogeneity, dispersion and lack of basic infrastructure. Therefore, to reduce multidimensional poverty in the conglomerates of greater poverty it is necessary to have a large amount of resources and a better redistribution.

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Annex

Figure A1
Conglomerate of Poverty (High-High)

Region	Province	Code	High-High			
			District	IPM 1990	IPM 2001	IPM 2010
Coast	Esmeraldas	802	Eloy Alfaro	0.6147	0.3966	
Coast	Esmeraldas	804	Quinindé	0.517	0.3297	0.2821
Coast	Guayas	904	Balzar	0.4853	0.3476	0.3038
Coast	Guayas	905	Colimes	0.5685	0.378	0.3307
Coast	Guayas	908	El Empalme	0.4935	0.3051	0.2639
Coast	Guayas	913	Palestina	0.4972	0.25	0.2217
Coast	Guayas	914	Pedro Carbo	0.5721	0.3268	0.2894
Coast	Guayas	918	Santa Lucía	0.5435	0.3676	0.3234
Coast	Los Ríos	1208	Vinces	0.496	0.3185	0.2781
Coast	Los Ríos	1209	Palenque		0.4078	0.3583
Coast	Manabí	1303	Chone		0.2863	0.2547
Coast	Manabí	1310	Paján	0.631	0.4184	0.3798
Coast	Manabí	1311	Pichincha		0.4575	0.4044
Coast	Manabí	1313	Santa Ana		0.3384	0.2978
Coast	Manabí	1316	24 de Mayo	0.5452	0.3895	0.3416
Coast	Manabí	1317	Pedernales	0.5558	0.3872	0.342
Coast	Manabí	1318	Olmedo	0.6012	0.4028	0.3518
Not delimited	Not delimited	9001	Las Golondrinas		0.3475	
East	Sucumbios	2101	Lago Agrio	0.5231		
East	Sucumbios	2103	Putumayo	0.5601		
East	Morona Santiago	1409	Taisha			0.4720
East	Morona Santiago	1412	Tiwintza			0.4278
East	Zamora Chinchipe	1902	Chinchipe			0.2652
East	Sucumbios	2104	Shushufindi	0.5330	0.2571	0.2276
East	Sucumbios	2107	Cuyabeno	0.6779	0.3344	0.2894
East	Orellana	2201	Orellana	0.5048		
East	Orellana	2202	Aguarico	0.5616		
East	Orellana	2203	La Joya de los Sachas	0.5590		
Mountain area	Chimborazo	608	Pallatanga		0.3097	0.2577
Mountain area	Cotopaxi	502	La Maná	0.5705		
Mountain area	Loja	1104	Celica			0.2231

Figura A2
Conglomerate of no Poverty (Low - Low)

Region	Province	Code	Low - Low			
			"Cantón" District	IPM 1990	IPM 2001	IPM 2010
Mountain range	Azuay	103	Gualaceo			0.1970
Mountain range	Azuay	105	Paute		0.2207	0.1799
Mountain range	Cañar	302	Biblián			0.1899
Mountain range	Cañar	306	Déleg	0.3926	0.1835	0.1544
Mountain range	Carchi	401	Tulcán		0.0902	0.0802
Mountain range	Carchi	402	Bolívar	0.4194	0.1537	0.1222
Mountain range	Carchi	403	Espejo	0.3	0.0934	0.0810
Mountain range	Carchi	404	Mira	0.4139	0.2053	0.1802
Mountain range	Carchi	405	Montúfar	0.3233	0.1166	0.0997
Mountain range	Carchi	406	San Pedro de Huaca		0.0764	0.0614
Mountain range	Chimborazo	607	Guano	0.3940		0.2029
Coast	El Oro	701	Machala	0.2662	0.0760	0.0689
Coast	El Oro	702	Arenillas		0.1222	0.1061
Coast	El Oro	703	Atahualpa	0.3736	0.1211	0.1034
Coast	El Oro	706	El Guabo	0.4142		
Coast	El Oro	710	Piñas	0.3203	0.1179	0.0996
Coast	El Oro	711	Portovelo	0.3204		
Coast	El Oro	712	Santa Rosa	0.2768	0.0867	0.0764
Coast	Guayas	911	Naranjal		0.2295	0.1919
Coast	Guayas	910	Milagro	0.2968		
Coast	Guayas	912	Naranjito	0.3281		
Coast	Guayas	927	General Antonio Elizalde	0.3446		
Mountain range	Imbabura	1001	Ibarra		0.0666	0.0612
Mountain range	Imbabura	1002	Antonio Ante		0.0936	
Mountain range	Imbabura	1004	Otavalo	0.3407	0.1672	0.1388
Mountain range	Imbabura	1005	Pimampiro		0.1653	0.1405
Mountain range	Pichincha	1701	Quito	0.1597	0.029	0.0259
Mountain range	Pichincha	1702	Cayambe	0.3972	0.1576	0.1325
Mountain range	Pichincha	1704	Pedro Moncayo	0.3729	0.1285	0.1069
Mountain range	Pichincha	1705	Rumiñahui	0.1299	0.0250	0.0228
Mountain range	Tungurahua	1801	Ambato		0.0966	0.0823
Mountain range	Tungurahua	1803	Cevallos		0.0627	0.0514
Mountain range	Tungurahua	1804	Mocha		0.087	0.07
Mountain range	Tungurahua	1807	San Pedro de Pelileo	0.3843	0.1731	0.1443
Mountain range	Tungurahua	1809	Tisaleo		0.1448	0.1196
Sucumbios	Sucumbios	2105	Sucumbios		0.1574	0.1295

Addressing horizontal inequality in Bolivia: what is the role of the fiscal policy?

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Abstract

Horizontal inequality refers to the difference in income (or other welfare indicator) due to membership in a specified group (determined, e.g., by race, gender, location, etc.). This difference could be relevant in a context in which certain groups have been historically excluded, as the case of indigenous people in Bolivia. In this paper, a tax-benefit incidence analysis model is used to assess the role of net public transfers on horizontal inequality in Bolivia for the year 2015. The group categories are: ethnic status, gender and location, besides a combination of these categories. Preliminary results show that the greatest group inequality is observed when the indigenous status is defined using an ethno-linguistic metric. However, the role of self-identification in determining indigenous status is less important in explaining the income gap. While the fiscal system seems to be progressive for indigenous and urban/rural categories, this "progressivity" is not present when the gender dimension is assessed. This result shows how there continues to be a need for the fiscal system to be reformed. Specifically, the system should incorporate a more direct mechanism of taxation via e.g. personal income tax which is not currently used.

Keywords: horizontal inequality, cash transfers, taxes.

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1. Introduction

The Latin American region has historically been one of the most unequal regions of the world. Goni, Humberto Lopez, and Serven (2011) state that inequality indicators (in particular the Gini coefficient) in the region are among the highest in the world, only after Sub-Saharan Africa, the most unequal region of the planet. Although in the last 20 years the Gini coefficient (which reflects the disparity between the top and the bottom of the income distribution) has been drastically reduced (Lopez-Calva and Lustig 2010), the region continues to have persistent inequality in various dimensions, including income, expenditures, wealth, education and health[2].

This trend in inequality reduction has been observed in Bolivia in the last decades. For example, Eid and Aguirre (2013) find that inequality in Bolivia fell 13 points (from Gini coefficient 0.59 to 0.46) between 1999 and 2011, outperforming any other country in Latin America in terms of inequality reduction. Some authors argue that the reduction of inequality is the result of redistribution policies (noticeably the increase in the minimum wage, see Canavire Bacarreza and Rios-Avila 2015). Another opinion is that the reduction is a consequence of the boom in commodities prices in the 2000s, which at the same time allowed the government to expand its social policy, for example through cash transfers. Vargas and Garriga (2015) state that the reduction in inequality was driven mainly by labor income, while non-labor income (e.g., transfers, remittances) played a minor role.

2. Literature review

The role of fiscal policy and its impact on vertical inequality in Bolivia has already been addressed by several authors. For example, Arauco, Molina, Aguilar and Pozo (2014) affirm that distribution policies in Bolivia have been ineffective. This could be due to the lack of focus of the cash transfers, which generates leaks. The limitations on the number of social transfers and the tax system (mostly regressive) also play a role. The authors find that the combination of taxes and transfers actually ends up hurting the neediest (those at the bottom of the income distribution). This research focuses on measures of vertical inequality (specifically, the Gini coefficient) to evaluate the distributive impact of fiscal policy.

There are some studies that address the issue of horizontal inequality and fiscal interventions. Cabrera, Lustig and Morán (2015) find that fiscal interventions in Guatemala had very little effect on the reduction of poverty and inequality, most likely due to a tax system that does not work. On the other hand, Lustig (2017) examines the role of fiscal transfers and taxes on indicators of inequality in Bolivia, Brazil and Guatemala. She finds that the tax systems in these countries reduce the income gap between indigenous and non-indigenous, but this reduction is very limited. She attributes the limited effect of these policies to the small size of transfers.

Although the aforementioned works already address the question of the impact of fiscal interventions on indicators of inequality between ethnic groups (white vs.

2 While income distribution is used as the most widely-used source of inequality, the Gini coefficient could be also calculated using other non-income dimensions, e.g. years of education.

indigenous), they are based on entropy indicators to measure the different components of quality (within and between group inequalities). In this sense, horizontal inequality is measured using a specific indicator (the Theil index). This indicator can be broken down into the components of inequality between groups and within the group (Haughton and Khandker 2009). The different dimensions of inequality are often intuitively considered as contributions to total inequality (proportions). A possible problem with the use of this indicator is that it depends on its contribution to a measure of "total inequality" (Stewart, Brown and Mancini 2005), and it is not an independent measure for group inequality.

The second problem in the literature on indigenous inequality is the tendency to oversimplify ethnic categorization, that is, as a fictitious variable. In principle, this division is useful to have a first idea of the effect of the fiscal system on the ethnic gap. However, a white vs. nonwhite classification seems simplistic and could trigger biases in the analysis. In this sense, in this paper I propose the construction of an ethnicity index, which takes into account several factors to establish the degree of the ethnic condition of a household. The index is composed of three elements: self-identification, language and location, each one of these elements contributes to the degree of ethnicity.

Finally, the literature has increasingly addressed the important topic of "intersectionality", a term coined to incorporate several dimensions of exclusion at the same time (Crenshaw 1991). In this sense, it is not the ethnic condition that could determine the exclusion of certain population segments, but the combination of two or more characteristics. The combination, for example, of ethnic and gender exclusion could determine a much more serious problem regarding discrimination of historically disadvantaged groups (Lenhardt and Samman 2015).

3. Data and empirical strategy

3.1. Data

The data for the incidence model of tax benefits come mainly from the 2015 Household Survey of Bolivia (Household Survey 2015), carried out by the National Institute of Statistics. The household follows the format of the World Bank's Life Standards Survey (LSMS) survey program and incorporates a variety of personal and family information related to demographic characteristics, household types, migration, health, education, work income, and expenses. The sample comprises 37,364 individuals grouped in 10,171 households. The data was collected between November and December 2015. The household survey is representative at the national level, with an urban / rural distinction. The sampling process considered stratification in a primary sampling unit (PSU), with the use of expansion factors. These expansion factors allow us to derive the corresponding figures at the national level of the samples collected. The survey design was taken into account in the summary statistics presented below.

In addition, the consumption module of the 2003-2004 household survey (ECH 2003-2004) is used to estimate the incidence of indirect taxes. This is because the ECH household survey 2003-2004 includes detailed information on consumption (that is, on the place where households made their purchases). If the purchase was made in a formal business, it is likely that the person would end up paying the indirect tax (which

is 13% of the value of the purchase). In addition, the information on program budgets and the number of beneficiaries come from the Ministry of Finance and the Ministry of Development, respectively. Finally, the information to estimate the incidence of subsidies for fuel (fuel for cooking and gasoline) comes from the Ministry of Hydrocarbons.

Table 1 shows the relevant demographic characteristics for the group categories analyzed. The table shows information on the counts and proportions of the total population in the three categories: indigenous, gender and location (urban / rural). With respect to the indigenous categories, the table includes information regarding the state of self-identification. In this sense, it informs the counting and the proportion of the people who declared belonging to one of the 37 indigenous groups formally recognized by law. Later in this article, some alternatives will be explored regarding the classification of indigenous / non-indigenous, using other criteria.

Table 1
Indigenous, gender and location proportions

Category	Proportion	
Non-indigenous	0.727	(0.0102)
Indigenous	0.273	(0.0102)
Male	0.495	(0.00238)
Female	0.505	(0.00238)
Urban	0.686	(0.00901)
Rural	0.314	(0.00901)

Standard errors between parentheses.
Source: Own calculations based on EH 2015.

The table shows that the proportion of self-declared indigenous, reaches approximately 27%, which is smaller in comparison with the figure in the 2012 Census (41.7%). As this is based on self-declaration, this change could be driven by a lower attractiveness for belonging to an indigenous category, especially after the 2009 proclamation of the new state.[3] With reference to the other grouping categories, the proportions show a fair distribution between men and women, and that less than one-third of the population lives in rural areas. In comparison with the proportion observed in 2012 (32.5%, according to the Census), this implies an increasing tendency for urbanization.

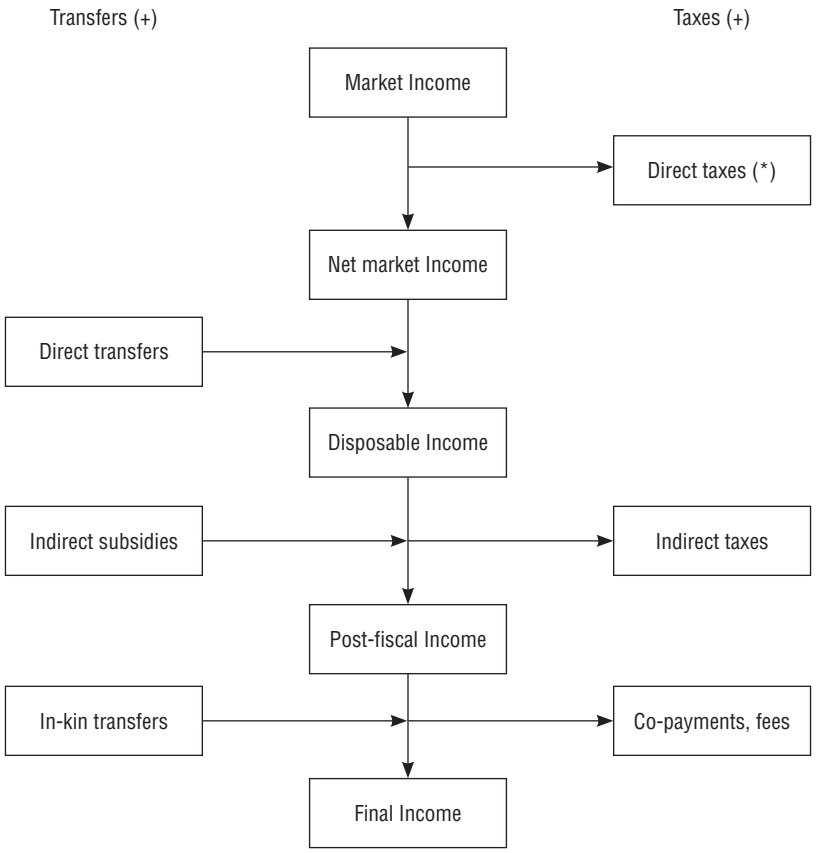
3.2. Empirical strategy

In order to estimate the net impact of transfer on horizontal inequality, I use a standard tax-benefit incidence analysis model This methodology consists in the identification and quantification of components of the individual income, starting from labor income, capital

3 In 2009, a new Constitution was approved changing the name from the "Republic of Bolivia" to the "Plurinational State of Bolivia". This change supposedly reflected the multi-cultural character of the country, including its more than 30 ethnic groups, although many of them remain almost without relevant representation (Uprimny 2011).

transfers, remittances, and other private transfers. Subsequently, the model incorporates further sources of income and taxes to finally reach the final income that an individual possesses after taking into account all the additional revenues and taxes, as well as cash transfers and in-kind transfers. These components are depicted in Figure 1, which illustrates the different income concepts, and the successive incorporation of taxes, transfers and subsidies, in order to reach the final income concept, which incorporates all the public interventions. This standardized methodology has been applied in a number of countries/case studies in order to assess the role of public transfers/taxes in reducing inequality measured through a standard indicator (Gini, Theil or Atkinson measures) (Lustig and Pereira 2016).

Figure 1
Income concepts



Source: Lustig and Higgins (2013).

In Figure 1, market income is composed of labor income (both coming from dependent and independent activities), as well as capital income and private transfers (including remittances and social security payments). As transfers are added and taxes are reduced from the disposable income, the market income will turn into a final income,

which includes all the deductions and cash transfers and in-kind transfers to which an individual is entitled. The research strategy then consists in comparing the indicators of group inequality with and without government intervention (i.e., for the market income and for the final income).

The framework expressed in mathematical is the following:

$$y_h = I_h - \Sigma T_i S_{ih}$$

Where I_h is income before taxes and transfers; T_i are net taxes of type i and S_{ih} is the share of net tax i borne by unit h.

Since the interest of the analysis lies on the indigenous, gender and urban/rural condition, the unit of assessment is the individual. As long as the household is subject to a variety of transfers, the entails adding the income and transfers received by all the members of the household, and then, dividing this whole amount by the number of household members, in order to have an estimate of each of the income components as shown in Figure 1.[4]

One important matter is how the indigenous status of a person is defined. For this purpose, the criterion used to define the ethnicity will be twofold. The first benchmark will rely on the self-identified indigenous status of the individual, provided in response to a specific question in the questionnaire. The remaining criteria relies on an ethno linguistic definition of the indigenous status: the person will be considered as indigenous if he/she speaks a native tongue in the first place (before Spanish), or if he/she has learned to speak in any indigenous language, or if he/she speaks any other indigenous language. There are various potential indicators for indigenous status, but these can be controversial and not very easy to identify. Martinez Cobo (1984) mentions for example (among others) the occupation of ancestral lands, common ancestry in these territories, culture (or specific manifestations of it, as religion, dress, etc.), and language. This last one tends to be less subjective (Permanent Forum on Indigenous Issues 2009), and in addition can be easily identified using the household survey information. The other grouping variables (gender and urban/rural location) are explicitly defined in the survey data.

Measures of horizontal inequality

Traditional measures of (vertical) inequality include the Gini coefficient, the so-called entropy measures (Theil L and Theil T), as well as the Atkinson inequality measure (Haughton and Khandker 2009). While the Gini coefficient cannot be decomposed into between-group and within-group inequality, the entropy measures (Theil family) can be decomposed in order to explore to which extent each dimension adds to total inequality.

To assess the impact of fiscal policy, one approach would be to calculate Theil L and Theil T indicators for the income distribution each of the income concepts depicted in Figure 1, and then assess the change in inequality in both dimensions (within and between

4 A sensitivity analysis will be performed using an adult-equivalent figure instead of the nominal number of household members.

inequality) and how much each of them represents in total inequality. However, some authors argue that it is more adequate to have an independent measure of horizontal inequality, rather than using one that depends on its contribution to total (vertical) inequality. Stewart and others (Stewart, Brown, and Mancini 2005; Stewart, Brown, and Cobham 2009; Stewart 2011) propose the following indicators to measure the horizontal inequality over defined groupings (native status, gender or location):

1. Group coefficient of variation (GCOV):

$$\frac{1}{\bar{y}}\left(\sum_{r}^{R} p_r(\bar{y}_r - \bar{y})^2\right)^{\frac{1}{2}}$$

2. Group Gini (GGINI):

$$\frac{1}{2\bar{y}}\sum_{r}^{R}\sum_{s}^{S} p_r p_s |\bar{y}_r - \bar{y}_s|$$

3. Group Theil (GTHEIL):

$$\sum_{r}^{R} p_r \frac{\bar{y}_r}{\bar{y}} \log\left(\frac{\bar{y}_r}{\bar{y}}\right)$$

Where year is the mean income (pre and post-transfer/taxes) of group r; p_r is the population share of group r, and y is the mean income. In the notation, r can be characterized as indigenous, female or rural status, for each computed horizontal inequality indicator.

In this sense, the strategy involves the calculation of the mentioned group-inequality indicators in each of the income stages to evaluate if the net transfers helped to reduce the ethnic, gender and locational income gap. Ideally, the role of the state would be to aim at raising the income of the groups in most need. Historically, native, female and people living in rural areas were excluded from formal labor markets, adequate education and health, and so for these reasons they tended to have less income. In an ideal setting, these characteristics (native status, gender and location) should not determine people's potential revenue (the so-called "equality of opportunities" approach (Roemer 2009; Roemer and Trannoy 2014).

3.3. Construction of the tax-benefit incidence model

A number of assumptions must be made in order to build the tax-benefit incidence model. The first assumption is that we consider the income per capita: all the sources of (net and gross) income are aggregated and divided by the number of family members. The inequality indicators are then calculated using the income per household member. For the sensitivity analysis, an adult equivalence scale will be used in order to identify changes in the distribution.

Market income

The first income component as showed in Figure 1 is market income. This component was calculated by aggregating labor income (dependent and independent), in-kind transfers related to the labor relationship, capital income, as well as all the private transfers (that is, all the transfers received by the individual that are not given by the government).[5]

In order to detect outliers, the calculated labor income was contrasted with the declared labor income incorporated as an original variable in the survey. In that sense, the BACON algorithm was applied (Weber 2010) to the proportion of declared income between calculated income, to exclude those observations that lie above certain tolerance level (0.025). Using this level, a total of 1,589 (out of 12,298) observations were flagged as outliers and excluded from the analysis.[6]

It is important to clarify the role of direct taxes in the Bolivian fiscal system. The closest tax to a personal income tax (PIT) is the complementary VAT tax (RC-IVA). It consists in taxing personal income above a certain level (those who received more than Bs.9,164 per month in 2015 - around USD1,300). However, these individuals are allowed to "discharge" the due amount by presenting their expenses up to certain sum to overcome this payment.[7] In this sense, the RC-IVA is a poor substitute of a PIT scheme and the tax revenue attached to it, is low with respect to the whole tax revenue in Bolivia (representing around 0.8% of total tax revenue in 2015). In addition, as the household survey does not identify this tax, it cannot be incorporated in the analysis.

Disposable income calculation implies the first intervention of the government in the flow showed in Figure 1. This income concept is calculated by adding the direct transfers provided by the government to the beneficiaries. The direct transfers are basically coming from the three main cash transfers programs active in the country: the "Bono Juana Azurduy", the "Renta Dignidad", and the "Bono Juancito Pinto".

The "Bono Juana Azurduy" is a conditional cash transfer program, and the beneficiaries of the transfer are pregnant women and children up to two years old, conditional on regular attendance to medical check-ups. The payments in cash given by the program are detailed in Table 2:

Table 2
Payments for the "Bono Juana Azurduy"

Item	Max. # of payments	Amount (Bs.)	Total (Bs.)
Pre-natal care	4	50	200
Payment at birth	1	120	120
Post-natal check-ups	12	125	1,500
TOTAL			**1,820**

Source: Vidal, Martínez, Celhay, and Gómez (2015).

5 The private transfers are: transfers from other persons in the country, remittances, compensation (e.g. redundancy payments) and non-labor earned transfers (private pension schemes).

6 The proportion of excluded observations is 11.44%.

7 For example, a person that in 2017 earns Bs.12,000 (roughly USD 1700) monthly, would have to pay Bs.321 under the PIT concept. However, if this person submits expenses for Bs.2474, he/she can avoid the payment of this tax.

Given the information in Table 2, the maximum amount that a household could theoretically receive (per child and per year) is Bs.1,820 (approximately USD 260). In addition to these cash payments, the program also covers the delivery of the children in public hospitals, and this amount is included in the health component of the in-kind transfers.

In reference to the "Renta Dignidad" program, it consists of a non-contributory pension scheme provided to all citizens older than 60 years old. The monthly amount provided in 2015 was either Bs.200 (USD 28) or Bs.250 (USD 35) depending on whether the recipient entitled to receive the benefit was receiving any other pension benefit. In the analysis in this article, the monthly amount is aggregated to yield a yearly payment per person and household.

Finally, the "Bono Juancito Pinto" is a conditional cash transfer, consisting of the payment of Bs.200 (USD 28) annually to school students (both primary and secondary school) that are enrolled in public schools (run by the government). The payment is conditional on greater than 80% attendance during the last academic year (running from February to November).

Post-fiscal income

The next component in the estimation of the final income is the incorporation of indirect subsidies and indirect taxes in the household income. With respect to the indirect subsidies, the household survey allows us to identify the subsidies to gasoline and to cooking gas (LPG). Together, they represent the main component of subsidies that can be identified using the household surveys.[8]

With respect to the price of gasoline, it is maintained at a fixed price of USD 0.70 per liter, while the international price is roughly double (based on information of the Ministry of Hydrocarbons). In that respect, the assumption I made is that the households would have spent twice as much on gasoline without the subsidy. This excludes a potential behavioral reaction to the non-existence of the subsidy, but this is a necessary assumption as this micro simulation model is a non-behavioral model. The subsidy component is only activated if the household possesses an automobile and/or a motorcycle.[9]

The price of LPG (cooking gas) is also subsidized in Bolivia. The price paid by the families is around USD 3 per container (a container weighs 10 kg). The international price of LPG is given by the Mont Belvieu TX Propane spot price. In 2015, this price was around double the domestic price of LPG in Bolivia, so I assume that the expenditure of the families in the absence of a subsidy would be double what they reported spending. Again, this rules out any behavioral consequence of the elimination of subsidies.

In this stage of the calculation, I incorporate the indirect taxes component of the tax-benefit incidence model. While the household survey does not identify the indirect taxes paid by the individuals, I use the indirect taxes incidence estimated by Cossio (2001).[10]

8 Subsidies to hydrocarbons represented 2.5% of total government expenditures in 2015.

9 A sensitivity analysis will be developed relaxing this assumption, that is, that not only the households that declared ownership of a vehicle were subject of the subsidy.

10 While this reference is somewhat old, the fact that the indirect tax rates have not changed provides support for relying on this source.

The author calculates the impact of indirect taxes by distinguishing their impact respect to different income quintiles. As expected, indirect taxes are regressive because the poorest people pay a greater proportion of their income on those, as compared with richer people. In addition, given that in the rural area people are not expected to buy goods from formal businesses, it is expected that the incidence of these taxes is lower than in urban areas. In that sense, I assume that the structure of the indirect tax incidence in the rural area is one third of the incidence in the urban area.[11] The incidence rates are shown in Table 3.

Table 3
Estimated incidence of indirect taxes

Quintile	Urban incidence	Rural incidence
1st (poorest)	25.0	8.3
2nd	18.0	5.9
3rd	19.0	6.3
4th	17.0	5.6
5th (richest)	15.0	4.9

Source: Own elaboration based on Cossio (2001).

Final income

The last step involves the calculation of the final income, by incorporating the in-kind transfers to the post-fiscal income.[12] This is the component of the calculation that requires most assumptions, as it has elements of health care and education that are not identified accurately by the survey's questionnaire. The first element is health care component of the in-kind transfers. In the health module of the household survey, I identify two interventions that do not require payment for the users of health services: the first one is general health attention, which is assumed not to be incurred by the user but by the public facility. The imputed in-kind health transfer is a fixed amount of USD 217 if the health facility is located in the urban area, and of USD 108 if the facility is located in the rural area.[13] A warning about this approach is that it cannot be determined how many times the person recurred to the health services. In that sense, I assume that the reported use of health facilities was done only once.

The second major health intervention is the delivery care. For women enrolled in the "Bono Juana Azurduy" program, this cost is covered by the health facility center. Again, I distinguish between rural and urban areas regarding the cost of this service and impute a value of USD 653 for deliveries in the urban area, while the cost for rural areas is USD 326 (half the cost in the urban area). These values come from the "Bono Juana Azurduy" Program and represent the average cost for delivery attention in their respective areas.

11 The indirect taxes evaluated are: IVA (value-added tax), IT (tax to transactions, is applied to the transfer of services and goods), ICE (sin tax), and IEHD (hydrocarbons tax).

12 The components related to co-payments and fees are assumed to be zero.

13 These imputed values come from information regarding the public budget assigned to health, divided by the population (Arauco, Molina, Aguilar, and Pozo 2014).

The other major component in the in-kind transfers' component of the income flow is the one related to education. I assume that every family member that attends a public education center (primary, secondary, or tertiary education) receive an in-kind transfer provided by the government by not having to pay fees for attending the education center. The imputed values are the same used by Arauco, Molina, Aguilar, and Pozo (2014), and vary depending on the level of education. For primary education, I assume a yearly cost of USD 317 for children in primary school; USD 250 for children in secondary school; and USD 1,338 for tertiary education. Again, these imputed values represent average costs, but in this case no distinction is made between urban and rural areas.

Finally, a small component of the in-kind transfers identified by the household survey is the "desayuno escolar", a free breakfast provided by the government in public schools. The implied transfer given by this program is assumed to be valued in around USD 28 per year (Arauco, Molina, Aguilar, and Pozo 2014).

The summary statistics regarding the different income concepts as described in this section are shown in Table 4.

Table 4
Summary statistics

	Current Bs.		
	Mean	SD	CV
Market income	14,354	14,876	1.036
Disposable income	14,663	14,893	1.016
Post-fiscal income	12,594	13,025	1.034
Final income	13,913	12,954	0.931

Source: Own elaboration.

4. Results

4.1. Overall and within-group inequality

To validate the process of data cleaning, overall inequality indicators were estimated to compare them with well-known sources. As the Gini coefficient is the most widely-used indicator for inequality, I concentrate on this measure. Table 5 contrasts Gini's own calculation using the EH 2015 with other author's calculations for the same period of time, where possible.[14] As it can be observed, the different estimations of Gini coefficients are very similar, providing a strong check and adding confidence to the process of data cleaning. The current figures can vary because of different methodologies, but the estimates lie among what is widely acknowledged regarding the overall inequality in the country.

14 The income concept used for this calculation was the disposable income, because it is used for official (reporting) reasons.

Table 5
Estimated GINI coefficients

Year	Gini	Reference
2013	44.2	Solt (2017)
2014	48.4	World Bank
2015	45.5	CEDLAS
2015	48.3	UNU WIDER
2015	46.3	Own calculation

As a next step, I calculate inequality indicators for each of the group categories (indigenous, gender, and location). This gives a better sense of the income distribution inside each category, as a complement of the group inequality indicators presented later in the document. Table 6 shows different inequality indicators for each of the groups analyzed. As per the Gini coefficient and the percentile ratio, the group with the most income inequality seems to be the rural group, followed by the indigenous group. Regarding sensibilities to different parts of the distribution, the general entropy measures (GE) indicate that the male group tends to be more unequal, especially in the top of the distribution (Jenkins 1999).

Table 6
Within-group inequality indicators

	Gini	p90/p10	GE(0)	GE(1)	GE(2)
Non-indigenous	0.45	10.27	0.42	0.36	0.52
Indigenous	0.48	14.74	0.49	0.4	0.57
Male	0.47	11.96	0.46	0.51	0.91
Female	0.46	11.67	0.45	0.3	0.43
Urban	0.41	6.88	0.32	0.37	0.52
Rural	0.52	17.37	0.59	0.39	0.58

Source: Own elaboration.

4.2. Decomposition of inequality

While the indicators showed in Table 6 point to the inequalities within each group, a first approach towards the inequality between groups is needed. As stated before, a characteristic of the Theil inequality index can be decomposed into "within" and "between" inequality. In this sense, Table 7 shows the Theil index (GE(0), GE(1) and GE(2)) for the different group categories, differentiating by its contribution to total inequality.

Table 7
Between- and within-inequality decompositions

GE(0)			
	Indigenous	Gender	Location
Between	2.4%	0.1%	10.2%
Within	97.6%	99.9%	89.8%
Total	100.0%	100.0%	100.0%

GE(1)			
	Indigenous	**Gender**	**Location**
Between	2.7%	0.2%	10.9%
Within	97.3%	99.8%	89.1%
Total	100.0%	100.0%	100.0%
GE(2)			
	Indigenous	**Gender**	**Location**
Between	1.8%	0.1%	6.9%
Within	98.2%	99.9%	93.1%
Total	100.0%	100.0%	100.0%

Source: Own calculations.

The results on inequality decomposition reveal that the component that explains most of the overall inequality is the within component, and the rural group is the one that has the greatest component of group inequality (between 7% and 10%). However, as stated previously, an independent measure of horizontal inequality would be more adequate to assess the level and changes of between-group inequality. In that sense, the group Gini (ggini) coefficient was calculated in all the four stages as shown in Figure 1, using the grouping criteria defined previously.[15] Table 8 present a summary of all the group-Gini coefficients calculated for the grouping categories: indigenous (various specifications), gender, and location (urban vs. rural).

Table 8
Group-Gini (GGini) coefficients

	Indigenous				**Gender**	**Location**
	Self	**First**	**Any**	**Learned**		
Market income	0.066	0.089	0.086	0.093	0.019	0.135
Disposable income	0.061	0.083	0.08	0.086	0.018	0.129
Post-fiscal income	0.056	0.079	0.074	0.081	0.019	0.109
Final income	0.054	0.076	0.071	0.078	0.017	0.106

Source: Own calculations. The indigenous sub-categories are: self (self-identification of indigenous status); first (respondent declared an indigenous language as the main one that he/she uses); any (respondent declared that he/she can speak at least one indigenous language; and learned (respondent declared that he/she learned to speak an indigenous language).

Indigenous inequality

The different group Gini (GGini) calculations for indigenous status are shown in Figure 2. As this entails different measurement as stated previously (regarding the self-identification and the ethno-linguistic component), the evolution of the GGini for each of the categories is presented, alongside the distinct income stages.

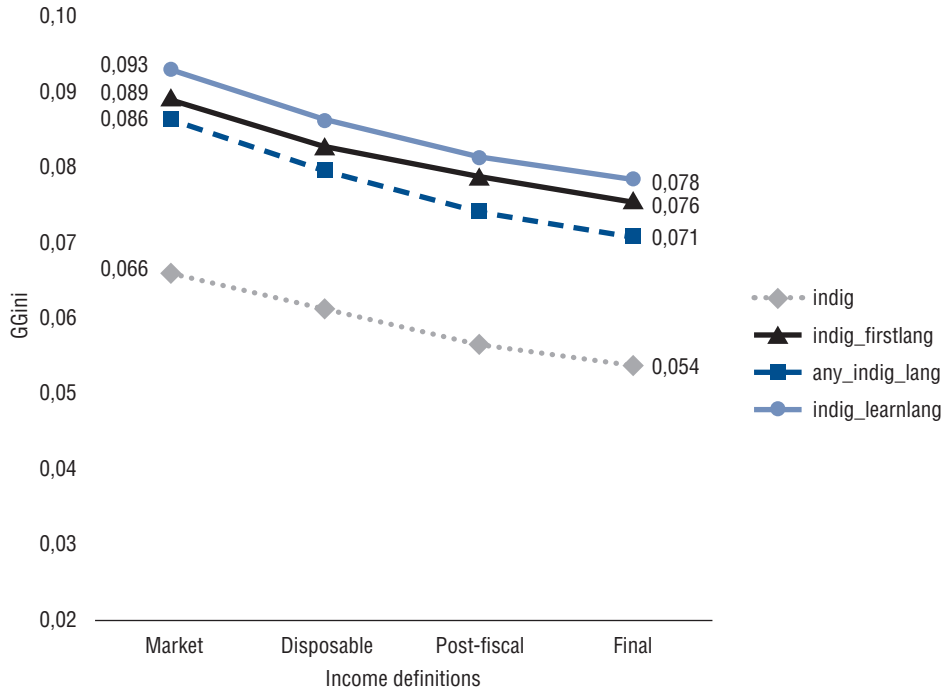
The first characteristic of this graph is that the fiscal system seems to be working in the expected direction: as net transfers are added to the market income, ethnic group

15 Because of its direct interpretation (same as regular Gini coefficient), the GGini is used in all the remaining estimations. The results corresponding to the other group-inequality indicators (GCov and GTheil) are available upon request.

inequality reduces, independently of the classification of indigenous status. The GGini is, however, rather small even in the first stage of the income flow (with no state intervention). This confirms the results of the inequality decomposition as shown in Table 7.

The second observation is that, assuming that being indigenous represents a disadvantage in terms of income distribution, the greatest group-inequality is associated with the ethno-linguistic definition of native status. Among this, the characteristic of having learned to speak in an indigenous language (indig_learnlang) is the most important, followed by declaring an indigenous language as the first language (indig_firstlang). By contrast, the self-identification (indig) criterion is the less important (lower line) in terms of the contrast between indigenous and non-indigenous.[16] This result could be confirming the well-known fact that language is an important barrier in terms of the interaction between minorities and a majority group in the society (Lang 1986), could produce segregation effects (Lazear 1999), and could represent a burden in terms of educational opportunities (Parker, Rubalcava, and Teruel 2005).

Figure 2
Indigenous GGini for different ethnic classifications



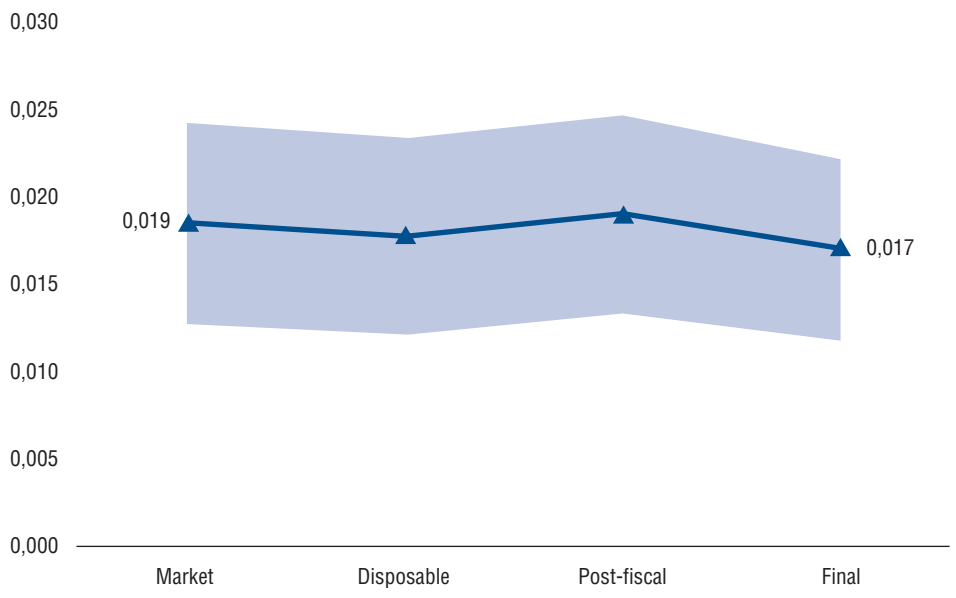
Source: Own calculations

16 Results from the GCov and GTheil (available upon request) confirm that the ethno-linguistic criteria are the most important when group inequality is assessed.

Gender inequality

In the case of gender inequality, Figure 3 depicts the movement of the group Gini in reference to the income concepts. The figure includes a point estimate and confidence intervals that were calculated using a bootstrap procedure (100 repetitions). The interesting observation here is that not all the state interventions reduced inequality as one would expect. Particularly, from the disposable income concept to the post-fiscal concept, the estimated group Gini increases from 0.017 to 0.019. The increase of group inequality reflects the fact that the indirect taxes component dominates the effect of the indirect subsidies. The fact that indirect taxes are mostly regressive is well known in the literature, either for developed economies (Garfinkel, Rainwater, and Smeeding 2006; Decoster, Loughrey, O'Donoghue, and Verwerft 2010) as well for emerging countries (Cabrera, Lustig, and Morán 2015; Lustig, Pessino, and Scott 2014) and particularly in the case of Latin America (Lopez-Calva and Lustig 2010). This evidence suggests that the tax system in Bolivia is regressive, as its main taxing component relies on indirect taxes, combined with the small amount of tax income. It is also surprising that the impact of net transfers on gender group-inequality is small (0.002), considering that one of the most important cash transfers is intended for women only (the Bono Juana Azurduy). This fact calls for a reform of the tax system not only in Bolivia but in Latin America, that historically has been one of the regions in the world in which the tax collection is among the lowest (as a percentage of the GDP) as a result of the flawed tax system (Corbacho, Cibils, and Lora 2013).

Figure 3
Gender GGini



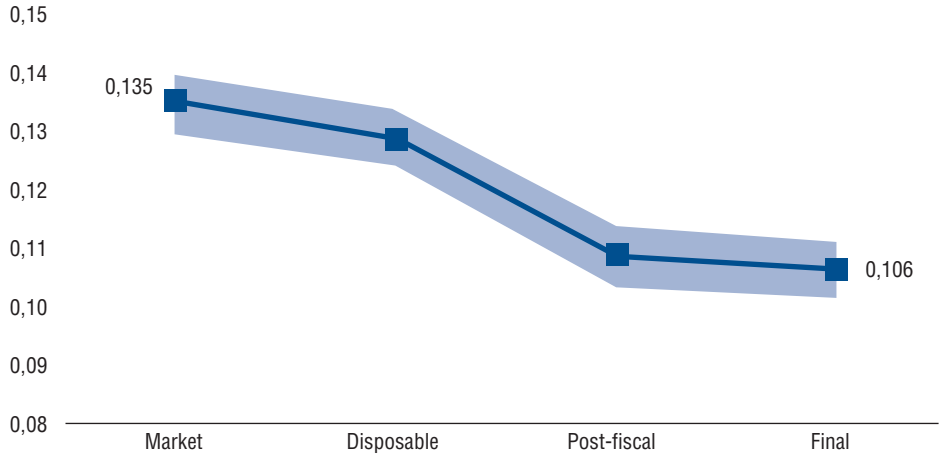
Source: Own calculations

Location inequality

Finally, Figure 4 shows the evolution of the group Gini coefficient considering location (rural/urban) alongside the income definitions (reflecting the distinct state interventions, as depicted in Figure 1). The first impression of the calculations is that this group inequality represents the largest Gini coefficient of the three categories (0.135 as compared with 0.09 for indigenous group inequality and 0.019 for gender group inequality). This would imply that the income differences between individuals living in urban versus rural areas is the most important single type of group inequality among those groups analyzed in the document. This result is also consistent with the empirical findings regarding the rural-urban gap in terms of consumption (Young 2013), income (Hnatkovska and Lahiri 2013), health (Van de Poel, O'Donnell, and Van Doorslaer 2009), and life conditions in general. Rural/urban group inequality ultimately reflects the degree of marginalization of traditionally disadvantaged groups (von Braun and Gatzweiler 2014), revealing the huge dissimilarities in productivity between traditionally rural sectors (mainly agriculture) compared to more "urban" sectors (industry, services, etc.).

The evolution of the urban/rural group inequality compared to the income concept reflects, however, that the state interventions reduce the income imbalance between persons from the rural area as compared with the urban area. This reduction, from 0.135 to 0.106 (decrease in 21%), represents the greatest reduction in comparison with the other two group inequality indicators.[17] This could be due to the fact that the incidence of the tax system (relying in indirect taxes) is more limited in the rural area, as the majority of businesses there are informal and not subject to taxes. Therefore, the impact on the individual consumer is limited, restricting the impact of this component in the locational group inequality indicator.

Figure 4
Urban/rural GGini



Source: Own calculations.

17 The group inequality regarding the indigenous status (ethno-linguistic criteria) decreases by 15%, while the gender inequality decreases only by 11%.

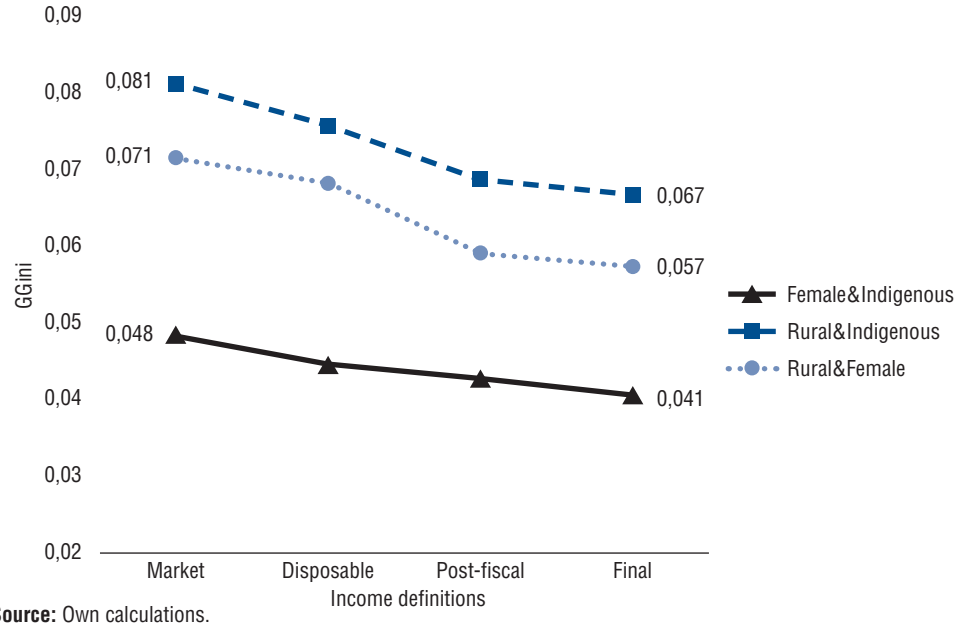
4.3. Intersectional ties

The combination of more than one characteristic in the group categories (gender, indigenous status or location) could explain a greater portion of horizontal inequality. For example, the indigenous condition could imply fewer opportunities e.g. in joining formal labor markets, but the condition of being indigenous and living in the rural area could involve even more discrimination and fewer economic opportunities. This combination of categories is coined under the concept of "intersectional" (Crenshaw 1991, Lenhardt and Samman 2015), and is used to emphasize the greater disadvantage caused by the membership in more than one traditionally disadvantaged group.

In this sense, in addition to consider group inequalities defined by single categories (i.e., indigenous, gender, and location), I combine two or more of these characteristics, and calculate the group Gini corresponding to each of these possibilities: being female and indigenous; being female and living in the rural area, and being indigenous and living in the rural area.[18]

The results of the tax-benefit incidence model show that the rural and indigenous combination is the one with more disadvantages from the point of view of group inequality. The group inequality in this component is smaller than the sum of the individual group-inequalities (indigenous and rural), but reflects the synergies of pertaining to more than one traditionally disadvantaged group. It is also noticeable that the state intervention in all the income phases' results in decreasing group inequality, as expected (Figure 5).

Figure 5
Intersecting inequalities

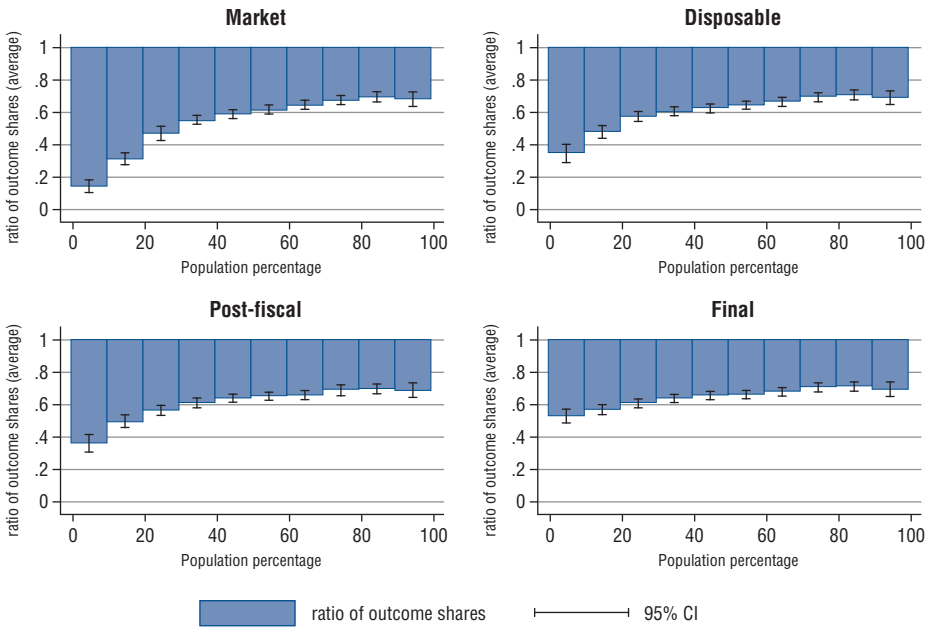


Source: Own calculations.

18 The definition of being indigenous was given by the ethno-linguistic characteristic of having learned to speak in a language.

Besides assessing the change in group-Gini coefficients, it would be useful to explore the inequalities within income categories (e.g., by decile). In this sense, the share corresponding to each income decile, compared to the base group, is estimated for all the income concepts. In other words, I calculate the proportion between the average income of the least advantaged group (e.g., being female and indigenous) and the average income of the base group (in this case, being male and non-indigenous), for each decile. The histograms for the intersectionality between being indigenous and female are shown in Figure 6.

Figure 6
Income proportion of being indigenous and female



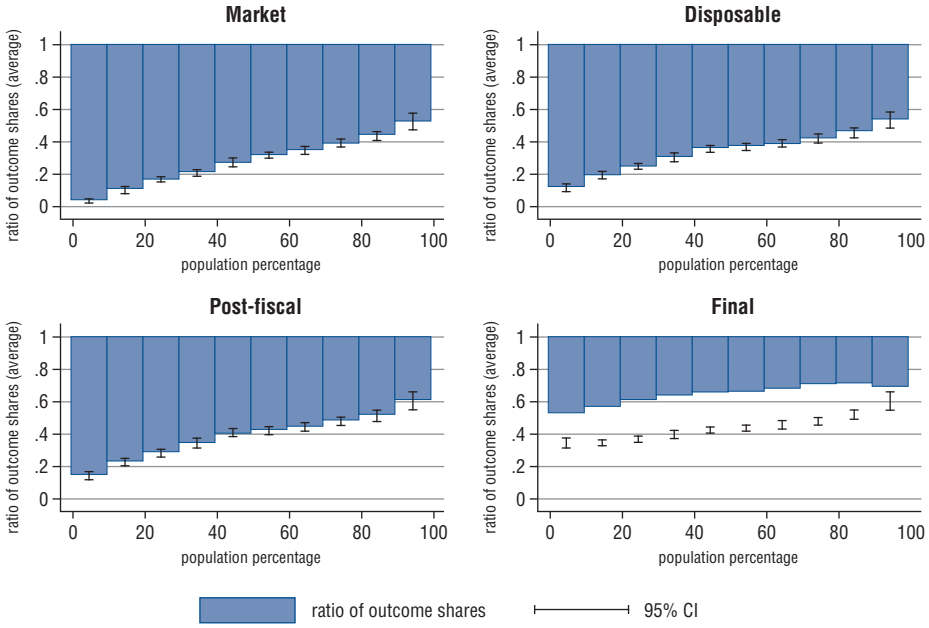
Source: Own calculations. The reference group is: non-indigenous and male.

From Figure 6, it can be seen that the market income for the bottom decile of the female and indigenous represents only 14% of the income of male and whites. In comparison with the top decile, this percentage is 68%. This shows that the intersecting categories are at a greater disadvantage compared to the base categories, and that the situation is worst in the bottom decile (for the poorest of the poor). The good news is that, as the state intervention in form of transfers and taxes is applied, this imbalance is partially corrected: in the final income histogram (bottom-right panel), the income of the poorest female and indigenous represents 53% of the male whites, while the percentage for the top decile is 69%.

In reference to the rural area and indigenous groups, the differences are even greater. Figure 7 show the histograms correspondent to this combination for each income

decile. The average income for the indigenous living in rural areas in the bottom decile corresponds to only 3% of the reference income (white living in urban areas). In the top decile, the proportion is 53% and on average it reaches to 28%. The fiscal interventions seem to balance this huge difference, as the proportion in the bottom decile approximates the one at the top deciles. Again, however, the most disadvantaged group before and after intervention is the poorest one (bottom decile).

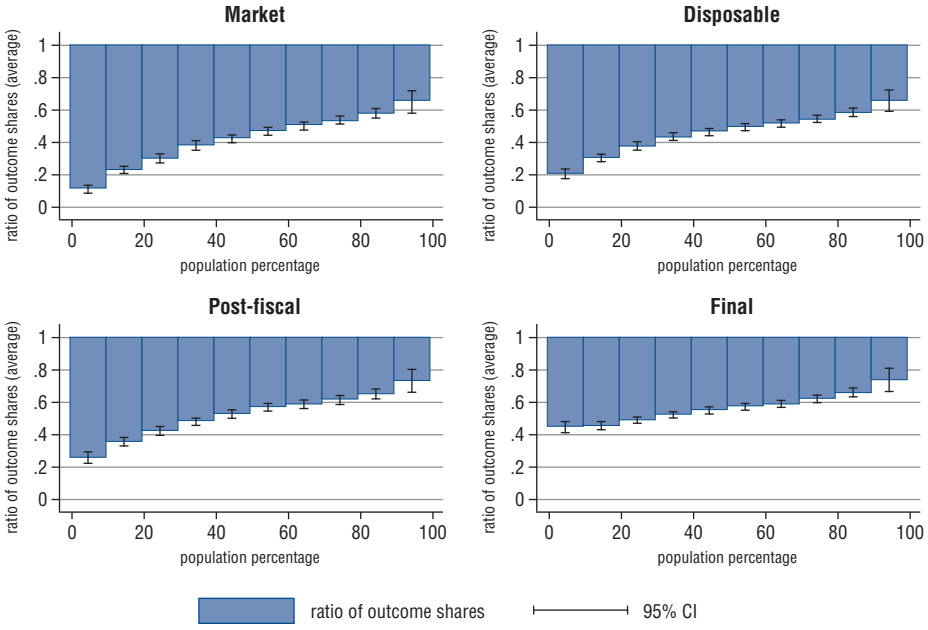
Figure 7
Income proportion of being indigenous and living in rural areas



Source: Own calculations. The reference group is: non-indigenous and urban.

Finally, Figure 8 shows the proportions of income of women living in rural areas, compared to the reference group (men living in urban areas). The estimations show that the income of women living in rural areas (bottom decile) is 11% of men living in urban areas, in the same decile. This proportion jumps to 44% with the state interventions of taxes and transfers (bottom-right panel). On the other hand, the proportion for the top decile without state intervention is 65%, and with state intervention this proportion increases to 73% of the base group income (men living in urban areas).

Figure 8
Income proportion of women living in rural areas



Source: Own calculations. The reference group is: male and urban.

5. "Indigenousness" index and income inequality

The definition of indigenous status is complex and entails various dimensions, from the cultural characteristics to the self-identification as pertaining to a native category. One of the downsides in using a categorical (dummy) variable to define the indigenous status of an individual is that it tends to oversimplify this multi-dimensional character (McNeish and Eversole 2013). In this sense, it would be worth exploring the use of a synthetic measure for indigenous status which incorporates various dimensions in the definition of this status.

Following Martinez Cobo (1984) and the Permanent Forum on Indigenous Issues (2009), the components of a synthetic measure for indigenous status could be location, language, self-identification, religion and other cultural characteristics. Of these, location (urban or rural), language and self-identification could be identified using the EH 2015 household survey.[19]

As a first step, a synthetic index of "indigenousness" was created based on the mentioned variables, applying the Multiple Correspondence Analysis (MCA) methodology (Wittenberg and Leibbrandt 2017). The MCA approach has been identified as an

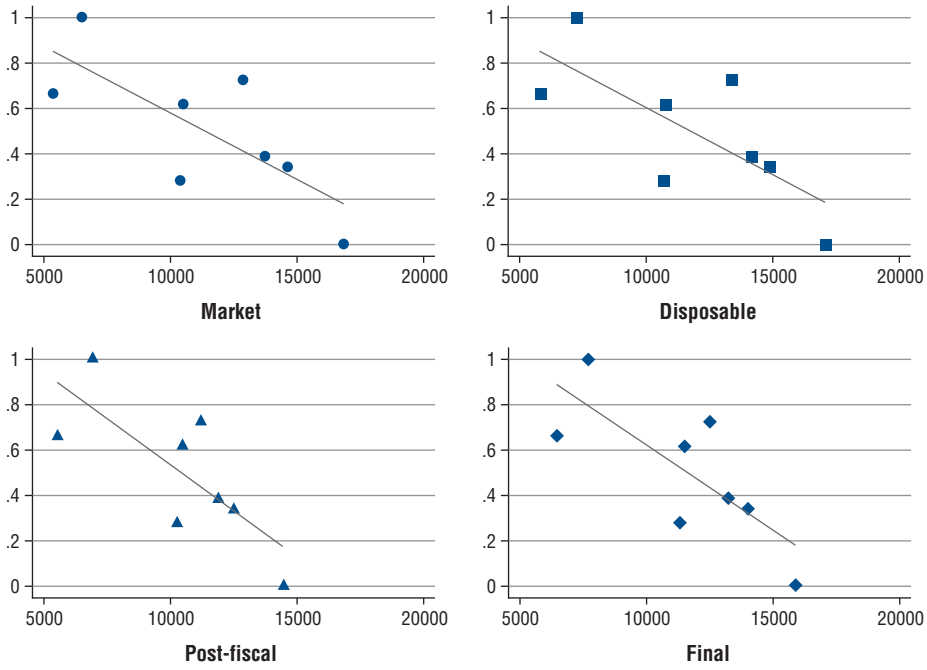
19 Of the three ethno-linguistic criteria, I use the most relevant: "learned to speak in a native language". The combinations using the other two indicators are available upon request.

alternative to the use of Principal Component Analysis (PCA) methodology (see e.g. citeNPFilmer.2001), mainly because its use is more appropriate in the context of categorical rather than continuous variables (Howe, Hargreaves, and Huttly 2008).

Once the indigenousness index was computed, it was normalized to take a range of values between zero and one, for easier interpretation. Because the index was constructed based on three variables taking 0-1 values, their values are similar for individuals having the same characteristics (i.e., a particular value of the index corresponds to an individual that considers itself indigenous, lives in the rural area, and learned to speak in an indigenous language).

Figure 9 is a scatterplot showing the calculated indigenousness index against the average values of the income concepts on each index value. The negative relationship between the index and all the income concepts is clear. This confirms the earlier finding in the sense that belonging or being associated with an indigenous status entails less income. This relationship is systematically observed alongside all the income concepts, and reinforces the idea of great income discrepancies with respect to the indigenous origin/character of the individual.

Figure 9
Indigenousness index and income concepts



Source: Own calculations. Horizontal axis: "indigenousness" index; vertical axis: income concepts.

What also is observed in Figure 9 is that the slope of the fitted curve tends to be steeper as a result of successive state interventions (represented by the consecutive income concepts): this confirms the result of the positive impact of government intervention in reducing the ethnic income gap (see Figure 2).

6. Sensitivity analysis

In order to verify the sensitivity of the main results to the chosen parameters, some modifications are applied to certain parameters of the tax-benefit incidence model: the indirect taxes rates and the subsidy rates for gasoline and cooking fuel. Both parameters will affect post-fiscal income, as depicted in Figure 1, so the changes are observed only in this stage of the income flow concept.

6.1. Indirect tax rates

One of the assumptions for the incorporation of indirect taxes in the model was the adoption of the incidence rates as shown in Table 3, estimated by Cossio (2001). An additional assumption was that the incidence in the rural area was lower, due to the predominance of informality in this area. I change this assumption, by assuming that in the rural area the effective incidence rate runs from 0.3 of the incidence in the urban area (assumption for the main results), to 0.5, 0.75 and 1 successively. In the last case, I assume that there is no difference between urban and rural areas with respect to the incidence of indirect taxes. Results of this sensitivity check are provided in Table 9 and shown graphically in Figure 10.

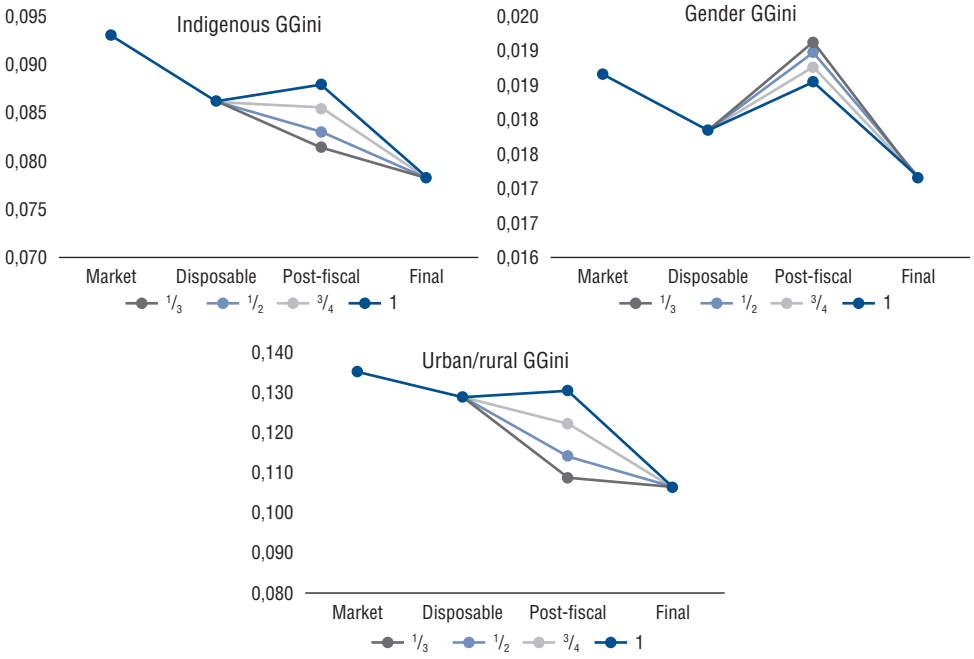
Table 9
Sensitivity analysis, indirect taxes

Incidence(‡)	Indigenous GGini(†)				Gender GGini				Location GGini			
	⅓	½	¾	1	⅓	½	¾	1	⅓	½	¾	1
Market	0.093	0.093	0.093	0.093	0.019	0.019	0.019	0.019	0.135	0.135	0.135	0.135
Disposable	0.086	0.086	0.086	0.086	0.018	0.018	0.018	0.018	0.129	0.129	0.129	0.129
Post-fiscal	0.081	0.083	0.085	0.088	0.019	0.019	0.019	0.019	0.109	0.114	0.122	0.130
Final	0.078	0.078	0.078	0.078	0.017	0.017	0.017	0.017	0.106	0.106	0.106	0.106

Source: Own calculations. The incidence row expresses the proportion of the indirect tax incidence assumed for the rural areas.
†: For the calculation of the indigenous GGini, it was assumed that the relevant grouping category was based on the "learned to speak in an indigenous language" characteristic.
‡: The original proportion in the main estimations was ⅓.

From the results shown in Table 9 and depicted in Figure 10, it can be seen that the increase of the indirect tax incidence in the rural area, has a negative effect on the indigenous group Gini and the location (urban/rural) group Gini. The increase in the income group inequality for the rural area is expected, as the incidence of indirect taxes increases in this area. In the same way, the indigenous group inequality is also increased as the incidence increases, because most of the indigenous people live in the rural area (63% according to the 2015 household survey). The sensitivity of group Gini to the indirect taxes incidence implies that the indirect tax become regressive when an equal share is assumed between urban and rural areas (corresponding to the last column of each group category in Table 9).

Figure 10
Sensitivity analysis, indirect taxes



Source: Own calculations. Horizontal axis: income concepts; vertical axis: GGini.

What is puzzling from the exercise is that gender group inequality decreases as the incidence of indirect taxes in the rural area increases. This could be simply due to the demographic structure of the Bolivian population in the rural area. However, despite the different incidence rates of the indirect taxes in the rural area, their impact is still associated with an overall increase of the gender group inequality, demonstrating the regressive nature of this type of tax, and the need to reform the fiscal system.

6.2. Subsidy rate

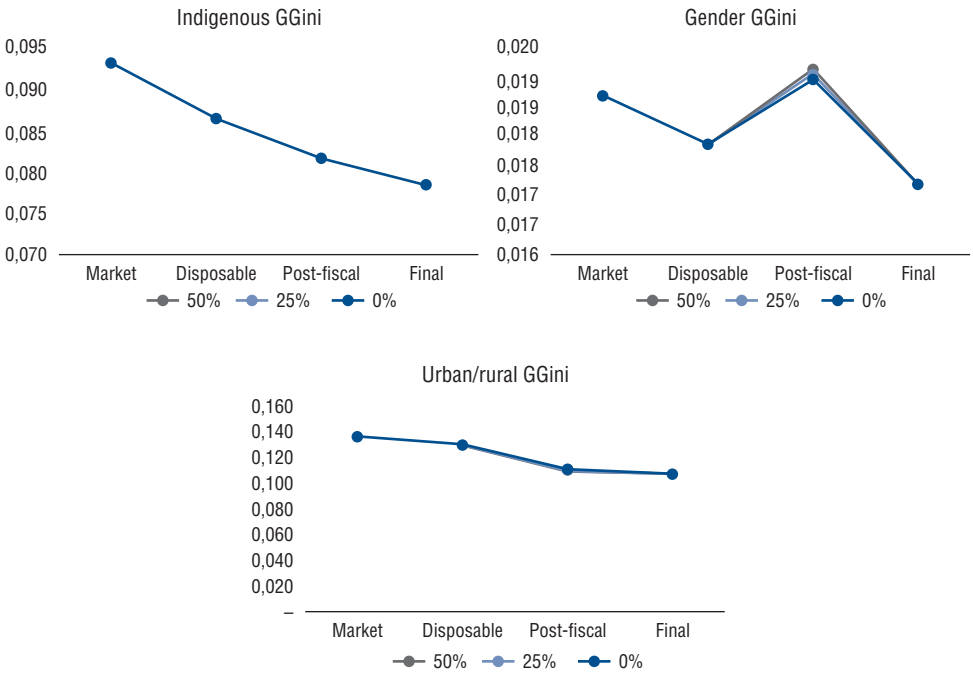
The next sensitivity check consists in the modification of the subsidy rate for gasoline and cooking fuel. In the main estimations, it was assumed that subsidy rate for each of them was 50%, based on official figures. Here I assume that the subsidy is sequentially reduced (25%) and eliminated (0%), for both fuels. The results of the exercise are shown on Table 10 and depicted in Figure 11. Unlike the results from the change in the incidence of indirect taxes, reducing and eliminating the fuel subsidies have a smaller impact on group inequality, with respect to the three grouping categories. The change in the GGini for indigenous status and for the location GGini (urban/rural) is indistinguishable, as Figure 11 shows. The change in the gender GGini is the most discernible: despite different subsidy rates applied to the model, the effect of indirect taxes continues to be regressive. This confirms the regressive characteristic of the tax system in Bolivia.

Table 10
Sensitivity analysis, subsidies rate

	Indigenous GGini(†)			Gender GGini			Location GGini		
Subsidy rate(‡)	50%	25%	0%	50%	25%	0%	50%	25%	0%
Market	0.093	0.093	0.093	0.019	0.019	0.019	0.135	0.135	0.135
Disposable	0.086	0.086	0.086	0.018	0.018	0.018	0.129	0.129	0.129
Post-fiscal	0.081	0.081	0.081	0.019	0.019	0.019	0.109	0.109	0.110
Final	0.078	0.078	0.078	0.017	0.017	0.017	0.106	0.106	0.106

Source: Own calculations. The subsidy rates row shows the different subsidy rates applied.
†: For the calculation of the indigenous GGini, it was assumed that the relevant grouping category was based on the "learned to speak in a native language" characteristic.
‡: The original subsidy rate in the main estimations was 50%.

Figure 11
Sensitivity analysis, subsidy rate



Source: Own calculations. Horizontal axis: income concepts; vertical axis: GGini.

7. Conclusions

The analysis of group inequality is highly relevant in contexts in which large segments of population have been historically excluded or marginalized. With the highest proportion of indigenous people as a percentage of its total population, Bolivia is certainly a case worth studying in order to assess the role of the state in reducing horizontal inequalities.

In this study, I evaluate the impact of the fiscal policy (system of taxes and transfers) in closing the ethnic, gender and urban/rural income gap. The results show that the adoption of an ethno-linguistic criterion implies a greater income group inequality. Within the ethno-linguistic components, the most relevant is if the individual learned to talk in a native language. This characteristic determines the biggest "shortcoming" regarding income distribution.

With respect to the other grouping indicators, the rural/urban component is the characteristic with the highest horizontal inequality in income. The imbalance is due most probably to the difference in productivity of activities traditionally linked to rural areas (i.e., agriculture), in comparison with the more diverse activities in urban areas (industry, services, etc.).

Considering gender inequality, the relevant feature was that state intervention (in form of net transfers) increases inequality in the conversion from disposable income to post-fiscal income (income plus indirect subsidies and minus indirect taxes). This could be an indication of the failure of the tax system, which relies mostly in indirect taxes, rather than in direct taxes (e.g., an income tax) that are yet to be implemented in the country.

I also explore the intersecting income inequalities, or the combination of more than one category of the analyzed groups. The results imply that the indigenous people living in rural areas are in the most disadvantaged category of the three considered (female and indigenous, and female living in rural areas). This result is consistent with the individual results with respect to single group-inequalities. In addition, I explore the potential use of an index that summarizes the indigenous condition, based on certain characteristics (language, self-identification, and location) that are linked to this status. The results imply that, on average, a continuous variable reflecting "indigenousness" is negatively related with income, confirming the previous results.

The policy implications of the findings call for a better design of the transfers and taxing system. The fact that the cash transfers have a universal character implies that always there will be the risk of leakage and that the people who need them least will end up benefiting more than others. In addition, indirect taxes could cause the dilution of the positive effect of cash transfers on income. Even worse, the indirect taxes affect mostly to the poor (given their regressive nature). In order for the fiscal system to deliver sustainable effects on poverty and inequality reduction, policymakers would have to fix it.

Future directions for research could include the exploration of a behavioral tax benefit incidence model, in which the change of the parameters also allows for the exploration of changes in the decisions of the economic agents implied (e.g., the elimination of a subsidy). In addition, the temporal dimension of the analysis could be also explored, enabling the analysis of the long-term impact of the fiscal system on inequality or poverty indicators.

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Combating poverty with efficiency: the new role of social transfers in Bolivia in a less favorable context[1]

Nelson Chacon & Horacio Valencia

Abstract

The super-cycle of raw materials has allowed Bolivia to grow above its historical level in recent years. In this context, the government has promoted a process of redistribution of resources through conditional transfers with the objective of increasing the stock of human capital and reducing the risks of poverty. However, these monetary transfers have weak targeting processes, which has generated high levels of filtration and mediocre impacts in terms of reducing poverty and inequality.

The current study identifies that approximately 21% of the population that benefited from some of the social programs between 2006 and 2015 was not in a poverty condition (measured by income and NBI) and that the population in poverty that is excluded of the programs has been declining over the years. Likewise, through a simulation of distribution, it is found that the impact of transfers on poverty and inequality has been small.

In this sense, in a less favorable external context (post-boom) and with an economy that maintains its high dependence on the prices of raw materials, income restrictions should encourage the search for greater efficiency in the allocation of social transfers. It is estimated that lower levels of leakage could mean savings of up to four percent points of GDP in relation to fiscal spending or that a more efficient reallocation of resources for the neediest population, would lead to better results in terms of reduction of poverty and inequality.

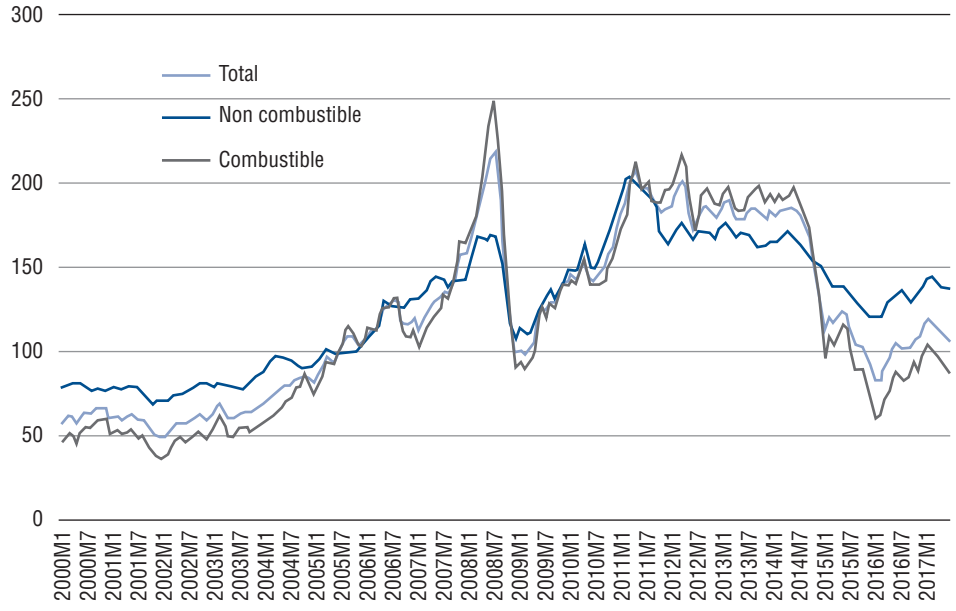
Keywords: Poverty and inequality, social transfers, public policy, Bolivia.

1 We appreciate the valuable comments of Pablo Rocha and Gerardo Damonte Valencia. The opinions and findings of this document are the sole responsibility of the authors and do not necessarily reflect the official position of the sponsoring institutions. Comments welcome to the emails nelchacon@gmail.com and / or horaciovalenciar@gmail.com

1. Introduction

Several countries of the world, and particularly the countries of the region, have been favored since mid-2000 for what came to be called the "super-cycle" of prices of raw materials, which, like no other cycle in the past, showed a generalized escalation in the prices of practically all raw materials. This scenario was possible, thanks to a combination of supply and demand factors, explained by the limited production of minerals and hydrocarbons in the world, besides China voracious demand for raw materials. Graph 1 shows the evolution of commodity prices from the beginning of 2000 to 2017, showing a significant increase in the price level from 2006 to the beginning of the mortgage crisis in the United States in mid-2008, and a second phase of the cycle - more stable and extensive than the previous one - which began in 2009 and ends in mid-2014.

Graph 1
Raw material price index (2005 = 100)



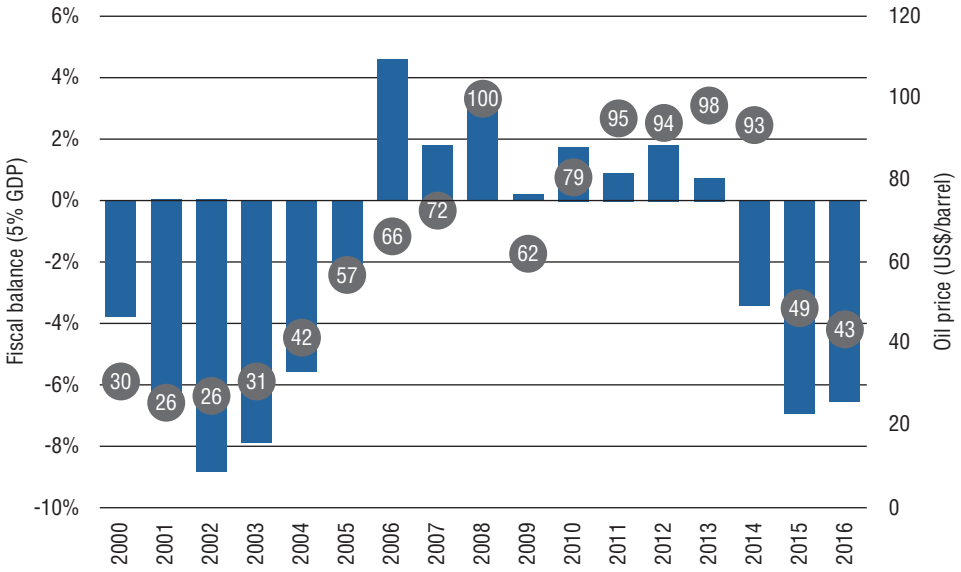
Source: International Monetary Fund, Primary Price System for Raw Materials.

In this context, Bolivia's economy also benefited from the international price escalation, which became materialized mainly through the increase in the prices of natural gas exports to Brazil and Argentina[2]. This favorable context allowed for a considerable increase in the country's fiscal revenues, which made possible to obtain fiscal surpluses through various periods (Graph 2). Between 2006 and 2014, public revenues increased at

2 The increase in the price of raw materials also benefits Bolivia through the increase in the price of mineral exports, although to a lesser extent than the price of gas.

an annual rate of 17%, compared to the annual growth of 11% between 1999 and 2005. It is interesting to note that the end of the super-cycle (2014 onwards) is associated with the deterioration observed, demonstrating the high dependence of the country's tax revenues on the performance of the traditional exporting sector.

Graph 2
Fiscal balance and average annual oil price (2005 = 100)

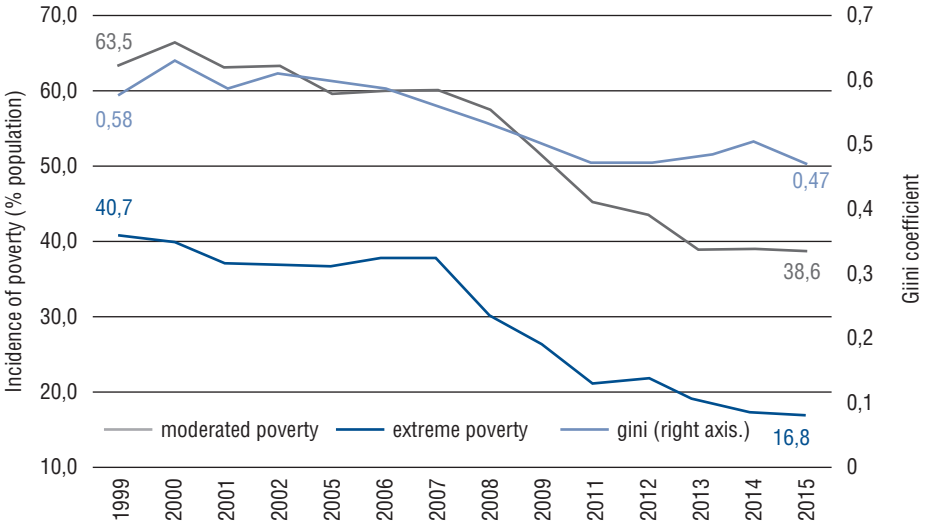


Source: Prepared by the authors with data from the Central Bank of Bolivia (BCB) and U.S. Energy Information and Administration.

Within the group of policies implemented as a result of this unprecedented access of resources, the redistribution of wealth programs stand out. Particularly, they emphasize the programs of social monetary transfers, which are usually associated with the reduction of the levels of poverty and inequality observed between 2006 and 2015 (Graph 3). Although these achievements are significant and noteworthy, in Bolivia there still persists a high level of poverty and inequality (measured through the Gini index) compared to the regional[3] average.

3 According to OECD data, in 2015, the regional poverty rate reached 29.2%, while the indigence rate was 11.4% (Economic Perspectives of Latin America, 2017). On the other hand, inequality in Latin America in 2015, measured by the Gini coefficient, was 0.469.

Graph 3
Poverty and inequality in Bolivia (1999-2015)



Source: National Institute of Statistics.

The goal of social transfers in Bolivia, as in other countries, is aimed at reducing poverty, lack of access to services and the risks to which the most vulnerable sectors of the population are exposed. There are two interesting features to highlight in the design of transfers: first, the implementation of transfers in Bolivia showed a clearly pro-cyclical behavior that could put their sustainability at risk, in addition to deteriorating fiscal results in a less favorable external context. Second, transfers have lax focus processes, which would lead to efficiency problems, limiting their potential effect and deteriorating fiscal results. In this context, the conjunction of the still high levels of poverty and inequality, the low level of efficiency of social transfers and a less favorable future fiscal context, urgently demand a more efficient management of public resources.

In this sense, this document seeks to broaden the discussion about the future of social transfers in Bolivia. For this purpose, and as a first step, it presents an evaluation of the efficiency of the three most important social transfer programs that the country has: the Juancito Pinto bonus, the Juana Azurduy bonus and the Renta Dignidad. For the purposes of the document, efficiency is understood as the real scope of the programs towards the neediest population, identifying that on average 21% of the beneficiaries of the transfers would not be the neediest one. Then, through a simple assignment exercise, it is estimated that these transfers have had a mediocre impact on the reduction of poverty and inequality, which would be explained mainly by the increase in the income of the poorest people as a result of greater employment opportunities in the lower segments of the distribution, which agrees with the findings of Vargas & Garriga (2015) who identify that during the last 15 years increases in labor income were concentrated in the manufacturing sector, especially among informal workers with low skills..

The document is structured as follows: section two presents a brief overview of the role that monetary transfers have played in the region, the third section of the document analyzes the transfers in Bolivia, detailing the main characteristics of the programs and the results and impacts obtained by them; the fourth section presents the data and methodology used; the fifth section of the document identifies and quantifies the leaks and exclusions of the programs between 2006 and 2015; the sixth section analyzes the effect of transfers on poverty and inequality; the seventh section discusses alternatives for a more efficient use of resources; finally, the eighth section presents conclusions and recommendations based on the results found.

2. Monetary Transfers in the Region

The monetary transfers, started in the region in mid-1990s and emerged as a result of a reform process to the poverty reduction programs that existed up to that time (Ibarrarán et al., 2017). Although it is common to associate monetary transfers with those that require compliance with specific conditions, in strict rigor, two types of transfers emerged in the region. The first, strictly conditional monetary transfers, where the transfer of money to the beneficiary was associated with the fulfillment of one or more conditions. The objective of these programs is to promote the accumulation of human capital, in an innovative way, to break the intergenerational cycle of poverty mainly through the acquisition of education and health. The second type of transfer arises in parallel (Robles et al, 2015) and corresponds to transfers of money destined for older adults. The objective of these transfers is to grant an amount of income, through a minimum pension, that allows reducing the risks of poverty and vulnerability to the elderly, a fact particularly relevant for this population group in the region where very few older adults have access to pension systems (Barrientos, 2006, Hernani & Mena, 2015).

There are at least three particularly interesting characteristics of transfers in the region. First, it highlights the fact that most of these were focused on vulnerable groups, a fact that increased their popularity by being aimed at people who need more help (Ibarrarán et al, 2017). Second, a large part of these transfers had a design oriented to evaluate and monitor their progress and results, which allowed to show the positive impacts of this type of programs in a rigorous manner (Rawlings & Rubio, 2005). Third, particularly in regard to programs to promote access to education and health, the vast majority of transfers presented conditions that allowed positive impacts (Baird et al., 2014).

Regarding the results of this type of transfers in the region, particularly in terms of conditional transfers, the literature has found positive impacts in terms of the accumulation of education and access to health, in addition to demonstrating positive impacts in the household consumption and significant effects in reducing child labor, poverty and inequality (McGuire, 2013, Baird et al., 2014, Ibarrarán et al, 2017). On the other hand, in what corresponds to the non-contributory pension programs, the evidence has found positive impacts on household disposable income, on consumption, on working hours, there is even evidence that this type of transfers has impact at a higher level of investments in households and impacts on access to human capital (health and education) of family

members living in the household (Martínez, 2005; Behrman et al., 2012; Galiani, Gertler & Bando, 2014; Hernani & Mena, 2015).

Both outcomes, the positive results of the evaluations carried out and the characteristic of being focused on the people who need it the most, made these policies widely adopted in the region. It is estimated that, in 2013, 17 countries in the region had some type of conditional cash transfer and it is estimated that around 135 million people benefited from these transfers (Robles eta al, 2015). Conditional transfers represented between 20% and 25% of family income and imply a tax burden of between 0.3% and 0.4% of GDP (Ibarrarán et al., 2017). In the same way, non-contributory pension programs were adopted in 18 countries benefiting at least 17 million people (Robles et al, 2015).

However, despite the fact that most countries have invested an enormous amount of resources and time to design targeting and follow-up processes, errors of inclusion (leakage) and exclusion (beneficiaries that do not request their benefits) persist. Robles et al. (2015) estimate that transfers in the region reached 50% of the extreme poor who live with a child under 18 in the home and 53% of the extreme poor households with an older adult. Likewise, it is estimated that 39% of conditional transfers and 40% of non-contributory pensions benefited non-poor households, this is much more frequent in urban areas. The authors find that in the region approximately 9% of the beneficiaries of the monetary transfers and 16.5% of the non-contributory pensions were intended for families with medium and high incomes, although with heterogeneity at the country level, with percentages as high as the one that Bolivia has, where 13% and 29% of the beneficiaries of conditional transfers and non-contributory pensions were not poor or Guatemala where less than 1% of the beneficiaries of conditional transfers and less than 6% of the beneficiaries of contributory pensions had average or higher income.

Likewise, the authors emphasize the fact that a better targeting of these programs could imply a greater reduction of poverty while at the same time reducing fiscal spending. The authors estimate that the transfer programs of all the countries of the region, with the exception of El Salvador, Guatemala, Honduras, Paraguay and Peru, could cover all the extreme poor with the same levels of transfers and that at the same time could have a positive impact on fiscal savings. In this analysis, the case of Bolivia stands out particularly, where a (more efficient) allocation of resources, focusing transfers only towards the extreme poor, could mean a reduction in spending of 0.83% of GDP.

3. Monetary transfers in Bolivia: History, evolution and estimated impacts

Bolivia, like other countries in the region, implemented monetary transfer policies aimed at reducing poverty and encouraging the accumulation of human capital. Among the main reasons that prompted the implementation of transfer policies in Bolivia are: the high level of poverty and inequality observed. As can be seen in Graph 3, in 2005 61% of the population was considered poor and the Gini index reached 0.61, one of the highest in the region.

According to official information, until December 2015, coverage of payments of transfers (conditional and non-contributory pensions) reached 45% of the Bolivian

population, benefiting 4,878,917 people including children, mothers and older adults (MEFP, 2016). As mentioned above, unlike most other countries in the region, monetary transfers in Bolivia are universal rather than focused on the poor (McGuire, 2013, Vera, 2011).

The main motivation for transfers in Bolivia to be universal is based on the explanation that since a large proportion of the population in Bolivia lived in poverty (in 2005, 61% of the population was poor) all these people would have been benefited by the transfer, even if having used targeting systems. Additionally, McGuire (2013) identifies the existence of technical limitations related to problems of bureaucracy, pressure from particular groups of civil society, the influence of international organizations and electoral objectives that also drove this decision.

Another particularity of the transfer programs in Bolivia is that they were not designed to be evaluated. First, none of the transfers analyzed had the baseline collection that would allow an analysis of the program's impacts. Second, the three transfers were implemented at the national level and did not have pilots to prove their effectiveness or operability (unlike Mexico, for example), which makes it difficult to identify the impacts of transfers. Although it is true that to date there are evaluations of the programs analyzed in this document, both by the Government and by private academics and researchers, all evaluations must appeal to non-experimental methods of identification and the assumptions that support them, for identify the impacts of the programs in the different areas.

In general, the results of the evaluations undertaken on transfers in Bolivia have shown weak or no positive impacts, with the Government's evaluations being particularly optimistic. However, it is striking that the results have not been as encouraging as in other countries of the region. This document argues that one of the main causes identified for these mediocre results is the universality of the transfers, which implied, together with a limited fiscal budget, a low monetary allocation in relation to family income. Additionally, it can be included that the inefficiency of the policy due to the fact of providing economic support to families that do not require it, also implied a lower allocation of money to the families that effectively require this support.

To understand the logic of monetary transfers in Bolivia, a brief summary of the context in which they were implemented and some impacts found in the literature are presented below.

3.1. Dignity Rent

The first transfer analyzed is called Renta Dignidad (Dignity Rent) (DR). This transfer aimed at older adults seeks to guarantee a minimum pension for a particularly vulnerable population group in Bolivia, which is characterized by a high level of poverty and a low level of access to contributory pensions (Valencia, 2011). Although Renta Dignidad was introduced under that name in 2006, the benefit is nothing more than the continuation of Bonosol[4], a non-contributory pension program implemented in Bolivia in 1997. The DR

4 The implementation of Bonosol in 1997 was possible thanks to the income obtained from dividends from the shares for the sale of strategic state companies. The design of the program had contemplated the payment of Bonosol for all people over 21 years of age in 1996 (Valencia, 2011).

differs from Bonosol in reducing the minimum age for access to the transfer from 65 to 60 years and the differentiation of the amount granted based on the possession or not, of a contributory pension. Additionally, unlike its predecessor, where the transfer was made annually, in the DR the beneficiary can choose the periodicity in which he receives the benefit between monthly, semi-annual or annual (Mena & Hernani, 2015).

The amount of the transfer was established in Bs.200 (USD 28.73) per month for those adults over 60 who did not have pension income and Bs.150 (USD 21.55) for those with pensions regardless of income level or family poverty[5]. In 2013, the amount of the transfer was increased to Bs.250 (USD 35.91) for those beneficiaries without access to contributory pensions and Bs.200 for those who did have a pension. The source of financing for the transfer corresponds to the Universal Old Age Income Fund, which comes from 30% of the income received from the Direct Tax on Hydrocarbons (IDH) and the dividends of public companies capitalized by the proportion corresponding to the State (Escobar et al, 2013). In the annual report of the Bolivian economy 2016, the Ministry of Economy and Public Finance (MEFP) points out that between 2008 and 2015[6] about 1.6 million older adults benefited (approximately 200 thousand per year) and an amount of USD 2,321 million, about USD 287 million per year, which represents 0.8% of GDP in 2016[7].

The literature that analyzes the impact of this transfer finds different results. Escobar et al (2013)[8], using a discontinuous regression identification strategy, finds impacts on household consumption of Bs.153 (USD 21.98, which represents an impact on 15% of per capita consumption) and an effect on reducing poverty by 13.5 percentage points (pp.). In both cases, the results are only significant in the urban area. It is striking that the impact of a transfer to alleviate poverty had an effect only in the urban area, since the rural area historically presented higher levels of poverty. One hypothesis for this phenomenon is that the impact of income only allowed those who were very close to the poverty line to leave poverty, but not the most vulnerable.

This same questioning of the results obtained by Escobar et al (2013) encouraged Hernani & Claure (2014) to replicate the analysis. Using the same source of information and using the same identification strategy. The authors find that the estimation strategy of Escobar et al (2013) should be carried out by a discontinuous fuzzy regression. With this new strategy, the authors do not find significant or strong impacts on consumption, income or poverty.

Finally, Hernani & Mena (2015) analyze the impact of the program using a strategy of identifying differences in differences and taking advantage of the change in the scheme between Bonosol (until 2006) and the DR (since 2007). The authors find an impact in

5 The Bonosol in the period 2003 to 2007 granted a transfer of Bs1,800 per year, equivalent to Bs.150 per month

6 Unfortunately, the information presented in the 2015 Report (last available at the time of writing this document) only contains aggregate information

7 For 2012, an outlay of 381 million dollars was calculated for the payment of the RD (Escobar et al, 2013).

8 It constitutes the government impact assessment, which was carried out from the Social and Economic Policy Analysis Unit (UDAPE) under the Ministry of Development Planning.

the reduction of poverty in those households with female beneficiaries of 10pp. although they do not observe significant impacts in the reduction of poverty or extreme poverty for those households with a male beneficiary nor for those households where there was a couple of beneficiaries. It is interesting to note that the authors find results that show a positive impact on the reduction of child labor in children living with a beneficiary and an increase in school enrollment, especially for girls.

3.2. Juancito Pinto Bonus

The Juancito Pinto Bonus (BJP) implemented as of October 2006, is a conditional cash transfer that aims to encourage school enrollment and reduce school absence and dropouts. The transfer was initially intended for children enrolled in public schools up to the fifth grade of primary school and granted a transfer of Bs.200 (USD 28.73) per year, conditioned on the child attending 80% of the classes regardless of the income level of the family. The analysis of compliance with the conditionality and payment of the transfer was made at the end of the school year (November or December of each year). Conditionality is verified through certification of a level of attendance greater than 80% through the Single Student Register (RUDE). The stipend was delivered to the student in the company of one of their parents or a relative.

In spite of not having suffered changes in the amount granted to the beneficiaries since 2006, the coverage of the transfer was changed. In 2006, the transfer was granted to children from public schools up to fifth grade of primary education, in 2007 children were included in sixth grade and in 2008 the group was extended to seventh and eighth grade students. In 2012, coverage was extended again to the third grade of secondary education (eleventh year of enrollment) and in 2013 it was extended for the last time to include all levels of education. Despite not being focused, the design of the transfer is progressive, because the families with the poorest income, have a greater number of children and because the better-off families tend to send their children to private schools (McGuire, 2013).

According to data from the MEFP (2016) for 2015, the benefit was delivered to 2.2 million students (21% of the country's population), which represented a payment of USD 64 million, which was equivalent to 0.2% of GDP. Originally, the financing of the transfer came entirely from the income obtained from the HDI, however, as the price of natural gas was reduced, the transfer was financed with the income of the profits of other public companies (YPFB 78%, ENTEL 7%, ENDE 4% and other 11%).

Official information indicates that the BJP would have contributed to reduce school dropouts from 6.1% in 2005 to 3.8% in 2014 (MEFP, 2016). However, this statement is naïve, in the best of cases, because it does not consider other factors that could have motivated a lower level of school dropout, such as economic growth above the historical average observed in the period analyzed.

The investigations that seek to estimate the impact of the program find different results. Vera (2011) through a bivariate probity model finds that the BJP[9] had no impact

9 Due to the information limitations of the household surveys and the fact that information about the reception of the transfer cannot be obtained, the estimate is made about the impact of the announcement of the transfer on the possible beneficiaries.

on school enrollment, school attendance or reduction of child labor, finding only some positive, but unstable, impacts for girls in rural areas. Based on this result, the author points out the need for a discussion about the focus of the program.

On the other hand, Aguilar (2014) through a multivariate analysis finds positive and significant impacts on the school enrollment and attendance rate. However, these results could be biased by the identification strategy used, which leads us to believe that the presented estimates do not correct the existing endogeneity. Finally, Villalobos & Moreira (2013) using a computable equilibrium model estimate a modest impact of the BJP on poverty, extreme poverty (0.8%) and inequality (0.2%).

3.3. Juana Azurduy Bonus

The Juana Azurduy Bonus (BJA) was implemented in 2009 with the aim of increasing the demand for institutionalized medical care for pregnant women and children under two years to reduce the high rate of maternal and infant mortality and to reduce the levels of malnutrition in children. .

To achieve this goal, the program consists of a transfer for future mothers every time they use institutional services for child and maternal care. Transfers of the program are granted separately, that is, for each prenatal care, for institutionalized delivery care and for each postnatal care. First, for each prenatal medical visit, up to a total of 4 and for an amount of Bs.50 each (USD 7.18). Second, a transfer of Bs.120 (USD 17.24) is granted for institutional delivery care. Third, a transfer of Bs.125 (USD 17.96) is made for each bimonthly postnatal visit of the newborn to a total of 12 visits. Like the other transfers, this was launched at the national level and does not depend on the level of household income. An exception to access the transfer, at least on paper, is that families do not have access to any health insurance. Additionally, women cannot access the transfer if their youngest child is less than two years old, if they had a child who died at birth two years ago and for those women who ended their pregnancy through an abortion. These last three conditions were implemented with the purpose of discouraging women from becoming pregnant repeatedly and for an interval of less than three years (McGuire, 2013).

In the case of this transfer, the financing comes from the General Treasury of the Nation and resources from the Ministry of Health. Official data from the MEFP (2016) indicate that for the 2015 management, transfers were made for USD 106 million and that 619 thousand mothers and 868 thousand children under the age of two were benefited.

As with the other transfers, there is no baseline that facilitates the identification of program impacts. The MEFP (2016) states that the transfer would have allowed a percentage of institutionalized deliveries of 71% to be reached, although the baseline is not defined and this assertion does not have an identification strategy which allows to isolate exclusively the impact of the program.

The official evaluation of the program[10] finds through two identification methodologies, the first of fixed effects and the second of discontinuous regression, that the program had a positive impact of 8pp. in early pregnancy care and that also increased

10 Prepared by the Unit for Analysis of Social and Economic Policies (UDAPE) under the Ministry of Planning.

the probability of prenatal care in 10pp. Likewise, the study finds a positive and significant impact on the number of postnatal controls and the increased possibility of receiving the vaccine against measles, rubella and mumps (SRP) and full immunization, although the program did not have impacts on the nutrition levels of the children served (Vidal et al., 2015). Ramos (2016) through Propensity Score Matching and using data from the 2014 Household Survey finds a positive impact of 2% on moderate poverty and 3% on extreme poverty.

4. Data and methodological definitions

This document uses as a source of information the household surveys collected by the National Institute of Statistics (INE) between 2006 and 2015. The surveys collected by the INE in the period analyzed have a similar design, which facilitates their comparability in addition to having been harmonized in all cases for its use[11]. It is worth to point out that in 2010 the household survey was not carried out.

The document performs poverty analysis using two measurement alternatives. First, poverty and extreme poverty are calculated by income, this is done by comparing the per capita income of the household with the poverty and extreme poverty lines (Table 1). For this purpose, a poor household is considered to be one that has a per capita income, lower than the poverty line for the geographical area and the respective year. While extreme poor households are those with income below the extreme poverty line by geographical area and corresponding year. Although the literature recommends the measurement of poverty by consumption (Robles et al., 2015), unfortunately the Bolivian surveys do not present consistent information regarding household consumption, which allows this calculation.

Table 1
Poverty line and extreme poverty

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Monthly Line of Poverty per person (Bolivians)											
Rural	281.5	294	360.1	456.7	423.8	n.d.	510.4	523.9	542.3	552.6	550.6
Urban	358.5	383.6	463.4	590.4	595.2	641.2	683.6	693.2	733.5	759.3	760.4
Montly Extreme Poverty Line per person (Bolivians)											
Rural	160.5	167.6	205.2	260.3	241.6	n.d.	290.9	298.6	309.1	315	313.8
Urban	190.4	203.5	245.1	311.3	313.6	337.8	360.3	365.5	387.1	400.6	401.3

Source: National Institute for Statistics (INE) with data on average consumer prices for the 9 capital cities including the city of El Alto for the years 2008 to 2016.
N.d. Rural poverty lines are not available for 2010, due to the fact that no household survey was conducted in that year.

11 The harmonization made in the databases for the present analysis includes homogenizing the variables used in terms of methodologies for calculating poverty, extreme poverty, poverty by NBI and others.

Secondly, and in order to have a structural approach to poverty, this document also studies the poverty of households according to their Basic Unsatisfied Needs (NBI). This methodology focuses on the measurement of poverty as a need. In this sense, the methodology analyzes the shortcomings of the goods / services that allow a household to satisfy its essential needs (INE, 2013). The particularity of this measurement is that it allows to identify structural poverty and not only conjunctural poverty.

The NBI measurement is made following the methodology used by the INE for the calculation of NBI for Household Censuses. The only difference with respect to the INE calculations corresponds to the calculation of the NBI level of Health because the household surveys do not include questions about the place where health services are obtained. For this reason, the calculation of the NBI health index only considers the use of a medical center used in childbirth[12].

Table 2
Components of the Unsatisfied Basic Needs Index

Housing	Building Material for Housing
	Available Space
Services and Basic Supplies	Sanitation
	Energy Supplies
Education	School backwardness
Health	Institutional Support

Source: Own elaboration based on INE (2013).

Depending on each component, the NBI calculation corresponds to the weighted average of the Housing NBI, NBI of Services, NBI of Education and NBI of Health. This classification allows the estimation of five groups of households by dividing the NBI path: i) households with basic needs met; ii) those on the threshold of poverty; iii) with moderate poverty; iv) in a situation of indigence and; v) in marginality.

Table 3
Components of the Unsatisfied Basic Needs Index

Poverty Condition	Tour of the NBI Index
Satisfied Basic Needs	-1 < NBI<-0,1
Poverty Line	-0,1 < NBI<0,1
Moderated Poverty	0,1 < NBI<0,4
Indigence	0,4 < NBI<0,7
Marginality	0,7 < NBI<1

Source: Own Elaboration based on INE (2013).

12 Additionally, the NBI calculation of health in the Census is made at the municipal level.

Regarding the identification of beneficiaries of transfers in Bolivia, it should be noted that unfortunately the household surveys in Bolivia are not longitudinal, so it is not possible to follow the individuals over time. Additionally, not all of the household surveys analyzed, contain information about the reception of the transfer (eg 2006 survey in relation to the BJP and 2009 regarding the BJA) and those that do have this information, ask about the reception of the transfer in the previous management in addition to not having the amount of the transfer, this being especially complex in the case of the BJA and the DR.

Based on these particularities and the fact that the transfers in Bolivia are universal (RD) or easily identifiable (BJP and BJA), the present study assumes for its calculations that all persons potentially benefiting from the transfer have received the transfer and are imputed the amount of the same according to the value they had in each year. This assumption is made knowing that this methodology is somehow naive and that it overestimates the percentage of people who received the transfer and the impact on their income, this bias should be particularly low if the percentage of people who do not collect their transfer is small[13]. In addition, considering that the objective of the study is to analyze the impact of these transfers on poverty and inequality, our estimates will allow us to approach the total expected impact of these in an optimal[14] scenario.

The following calculations are made to carry forward the identification of the beneficiaries in each of the three programs:

For the DR, it is assumed that all persons over 60 years of age receive the transfer amount based on the holding of income by contributory pension or not (Bs.200 and Bs.150 per month, respectively). For the calculation, the change in the amount of the transfer of Bs.200 and Bs.150 from 2006 to 2012 and Bs.250 and Bs.200 from 2013 to 2015 is considered.

In the case of the BJP, all students enrolled in public education up to fifth grade in 2006, up to sixth grade in 2007, up to eighth grade between 2008 and 2011, up to third year of secondary education in 2013 and up to the fourth year of secondary in 2015. The amount of the transfer remained unchanged over time and is Bs.200 annual (Table 4).

Finally, in the case of the BJA, all pregnant women and children under two years of age are considered beneficiaries as of 2009 (the year in which the transfer was created). The amount of the transfer is estimated at Bs.320 for all pregnant women and Bs750 for each child under two years. The calculation of the transfer for pregnant women is done according to the four prenatal checks requested of Bs.50 each and to the delivery with a payment of Bs.120. In the case of children under 2 years of age, an amount of Bs.750 is calculated, corresponding to the payment of Bs.125 for each bimonthly[15] postnatal check-up.

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13 For example, Vera (2011) argues that 90% of the potential beneficiaries of the BJP received the same and Valencia (2011) analyzes the Bonosol and estimates that approximately 80% of the elderly received the transfer.

14 What could be emulated in the terminology of ITT impact evaluations.

15 It is important to note that the transfer considers the payment of up to Bs.1.500 for 12 postnatal check-ups with a periodicity of 2 months. Considering that the surveys analyze the annual income of the families, only the income for the first 6 controls is considered.

Table 4
BJP Eligibility Status

Level of Education (Year of registration)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
6	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
7	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
9	No	No	No	No	No	No	Yes	Yes	Yes	Yes
10	No	No	No	No	No	No	Yes	Yes	Yes	Yes
11	No	No	No	No	No	No	Yes	Yes	Yes	Yes
12	No	No	No	No	No	No	No	Yes	Yes	Yes

Source: Own elaboration with data from the Ministry of Education.

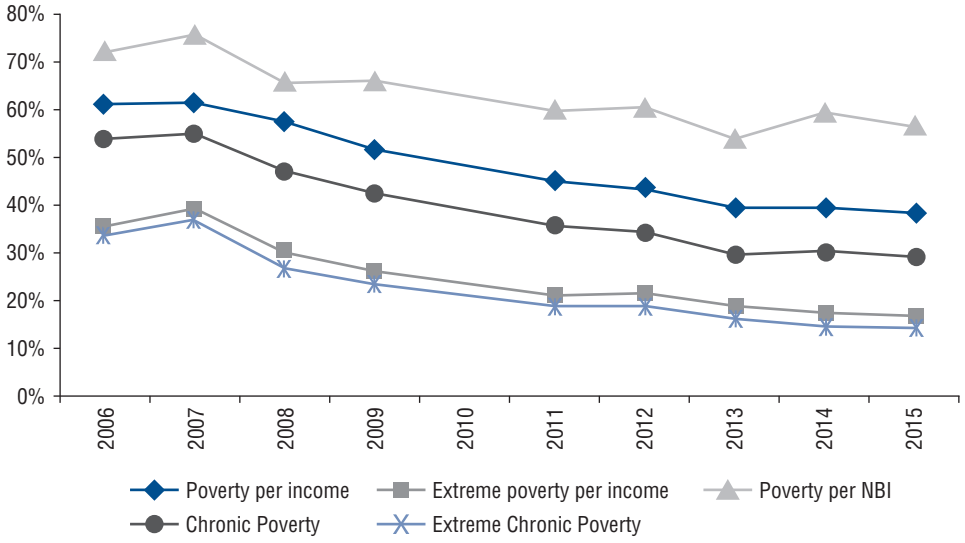
5. Identification of leaks and exclusion of monetary transfers

The method for identifying leaks from the monetary transfer programs for the present study consists of locating those beneficiaries who would meet the requirements required by the transfer programs and which were previously detailed.

Once the potential beneficiaries have been identified in the databases, their poverty situation is evaluated, which is considered as the main criterion of vulnerability of the population, in other words, we say that a monetary transfer is efficient if it is received by poor people. However, the categories of poverty are also varied, so in this study we focus our attention on the definitions of moderate and extreme poverty by income as well as the level of poverty for unsatisfied basic needs (UBN) and chronic poverty (which results of the combinations of poverty by UBN and moderate and extreme poverty).

The reason behind the decision to include these different categories of poverty is explained by the interest in observing the performance of transfers in different contexts of poverty, ranging from conventional definitions according to poverty lines (in the cases of moderate and extreme poverty).), which are characterized by greater volatility; even definitions of poverty by NBI that is linked to structural poverty. In Graph 4, we can see the evolution of the five poverty criteria that we analyzed, which show a decreasing trend in all cases, although they also make evident the important differences in their respective incidences, highlighting the NBI criterion according to which a greater part of the population would continue to suffer from poverty, 57% of the population in 2015.

Graph 4
Estimates of different poverty indicators for Bolivia (2006-2015)



Source: Own elaboration with data from Household Surveys.

5.1. Leaks

As previously indicated, the estimations are made in two steps, in the first one the identification of potential beneficiaries of each of the three programs is carried out, in order to classify them according to the poverty categories in such a way that in the end we can have information about their beneficiary, or non-beneficiary status and whether they are poor or not within each of the poverty criteria for all the years where information from household surveys is counted.

Graph 5 shows a synthesis of the results, each one of them presents dispersion diagrams for the three transfers (BJP, BJA and RD) and for each year; the abscissa axis presents information on the percentage of the beneficiary population that is categorized as poor, while the axis of the ordinates shows the same percentage, but for the beneficiaries who are classified as not poor. The 45-degree line in each graph gives the reference to observe biases in the distribution of transfers to poor beneficiaries (below the line) or to the non-poor (above the line), note that following our definition of efficiency, we should expect to see more points below the line to show efficiency of transfers. The graph is broken down into five panels, where each corresponds to the different poverty criteria to be analyzed.

As can be seen, the results are quite heterogeneous and vary according to the criterion of poverty used. However, it is observed that in the case of extreme poverty (panel b) monetary transfers in Bolivia would have shown a greater degree of inefficiency, since practically all the points of the dispersion are above the 45 degree line, that is, clearly

oriented towards beneficiaries who are not in extreme poverty. At the other extreme, in the case of poverty by NBI (panel c), it is observed that the transfers would be focused on beneficiaries who are in poverty by NBI, which makes sense, since it was previously noted, this would be a more structural poverty criterion, where a greater part of the population would be included, and therefore, it would implicitly remain within the group of beneficiaries of the programs, which, as mentioned above, was the main argument for the government to justify universalization of benefits.

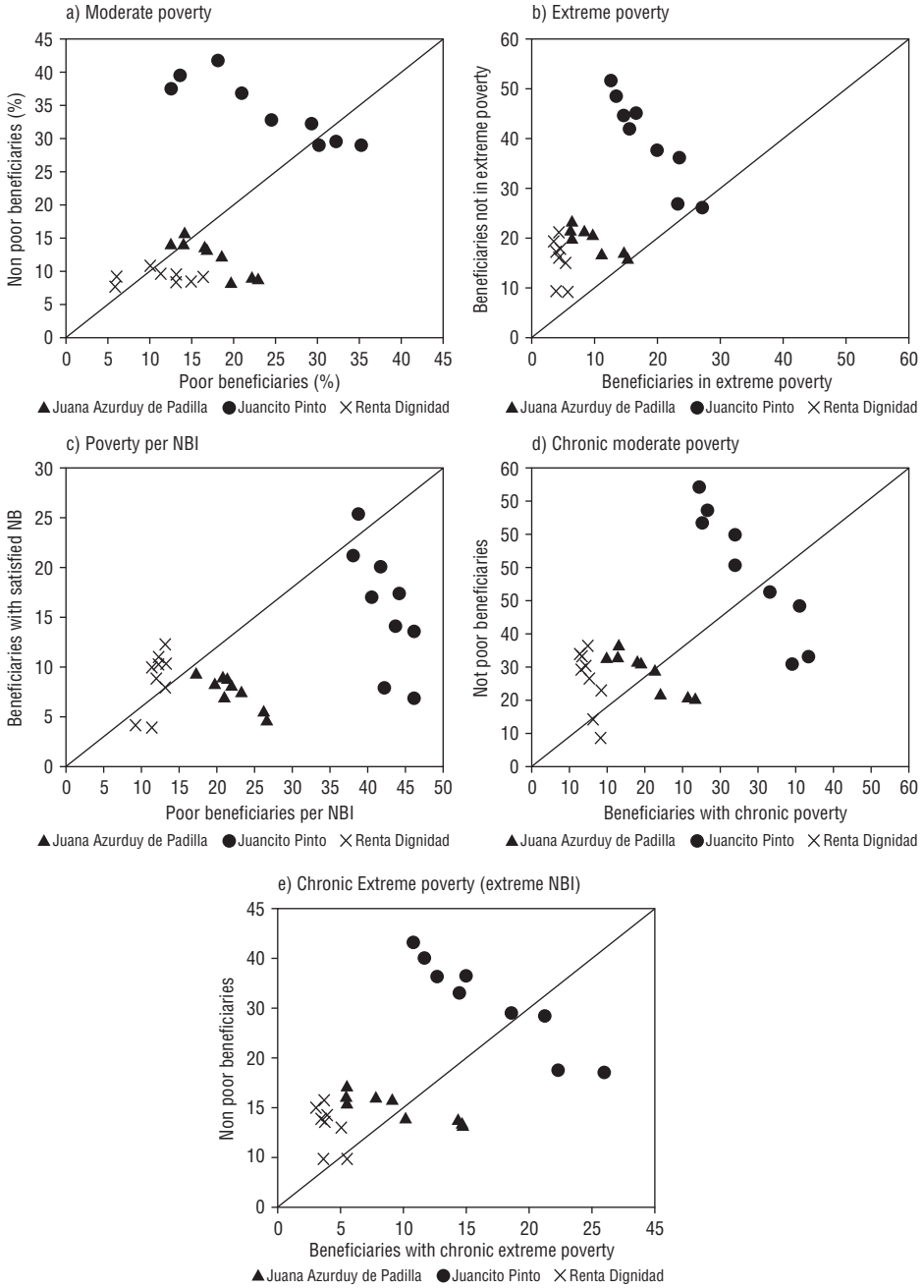
The rest of the panels show intermediate cases, but in all of them there is at least one program and one year in which there is a bias towards non-poor beneficiaries, which supports the notion of inefficiency in their distribution. The case of the BJP stands out, which would be the transfer that would show the highest levels of inefficiency, this is explained by the same conditions, which only require registration in a public educational unit and a minimum attendance, which results in a high heterogeneity of the beneficiaries, with leaks not entirely significant as will be seen below given the reduced amount of the benefit.

Something similar happens with the heterogeneity of the beneficiaries of the DR, where the criterion of compliance is simply age, which does not allow focusing the program on the neediest, although in this case the volume of expenditures is greater. Finally, the BJA would be the least biased or inefficient, as can be seen, in most cases its distribution is located near the 45 degree line, usually below it, a fact that could be explained because in some way, the requirement of not having health insurance to access, the benefit would be orienting the program towards the poorest women.

Once the level of leakage of the transfers has been identified, we proceed to quantify the magnitude of the inefficiency in monetary terms, this in order to estimate the weight that leaks have on public finances. Tables 5, 6 and 7 show data on the current beneficiaries of each of the programs, the monetary resources that were allocated to each transfer in the different years, the estimates of leaks both in number of beneficiaries, and in monetary units, and finally as a percentage of the Gross Domestic Product (GDP) according to the different poverty criteria. In all three cases and as before, the estimates of the leaks vary according to the criterion of poverty that is considered.

In the case of the BJP, it is estimated that the leaks would have reached 28% of the beneficiaries in 2015, that is, almost 664 thousand students (out of the 2.23 million) who received the transfer would not be in moderate poverty, justify its participation, filtration rises to 1.15 million students if extreme poverty is considered as a criterion. Regarding the fiscal magnitude of the leak, it is estimated that this was between 0.05% and 0.10% of GDP in 2015, depending on the poverty criterion used as a reference.

Graph 5
Distribution of transfers among potential beneficiaries according to different criteria for measuring poverty



Source: Own elaboration with calculations based on household surveys.

Table 5
Estimation of BJP program leaks

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Students benefited (in millions)	1.08	1.32	1.68	1.67	1.65	1.62	1.75	1.89	2.13	2.23
Bonds payment (in $US millions)	26.92	33.54	46.03	47.27	46.63	46.44	50.30	54.24	61.28	64.05
Bond payment (in % Gross Income Product)	0.24%	0.26%	0.28%	0.27%	0.24%	0.20%	0.19%	0.18%	0.19%	0.20%
Benefited students who are not poor according to income criteria (in millions)	0.41	0.52	0.70	0.61	-	0.53	0.56	0.55	0.63	0.64
Benefited students who are not extreme poor according to income criteria (in millions)	0.29	0.34	0.61	0.63	-	0.68	0.79	0.84	1.03	1.15
Benefited students who are not poor according to NBI (in millions)	0.09	0.09	0.23	0.23	-	0.27	0.30	0.40	0.43	0.56
Benefited students who are not chronically poor (in millions)	0.17	0.22	0.40	0.44	-	0.49	0.61	0.69	0.82	0.93
Leaks to non-poor beneficiaries (in millions of USD)	10.07	13.21	19.14	17.36	-	15.22	16.14	15.67	18.06	18.42
Leakages to extreme non-poor beneficiaries (in millions of USD)	7.23	8.69	16.66	17.74	-	19.35	22.59	24.06	29.52	32.95
Leakages to extreme non-poor beneficiaries NBI (in millions of USD)	2.12	2.30	6.24	6.63	-	7.84	8.72	11.43	12.27	16.20
Leakages to chronic non-poor beneficiaries (in millions of USD)	4.15	5.50	11.11	12.38	-	14.06	17.43	19.79	23.55	26.81
Leakages to non-poor beneficiaries (in% of GDP	0.09%	0.10%	0.12%	0.10%	-	0.06%	0.06%	0.05%	0.06%	0.06%
Leakages to non-extreme poor beneficiaries (in% of GDP)	0.06%	0.07%	0.10%	0.10%	-	0.08%	0.08%	0.08%	0.09%	0.10%
Leakages to non-poor beneficiaries NBI (in% of GDP)	0.02%	0.02%	0.04%	0.04%	-	0.03%	0.03%	0.04%	0.04%	0.05%
Leakages to non-chronic poor beneficiaries (in% of GDP)	0.04%	0.04%	0.07%	0.07%	-	0.06%	0.06%	0.07%	0.07%	0.08%

Source: MEFP, INE and own calculation with information of household surveys.

For the BJA, the leaks would have reached 14% of the beneficiaries in 2015, that is, close to 30,000 women and children (of the 190,000) who received the transfer would not be in a condition of moderate poverty that justifies their participation, Filtration rises to 22% of beneficiaries if extreme poverty is considered as a targeting criterion. Regarding the fiscal magnitude of the BJA filtration, it is estimated between 0.01% and

0.02% of GDP in 2015 depending on the criterion of poverty that is used as a reference, this being the benefit that less outlays to the government because of the reduced number of beneficiaries compared to the other two transfers (BJP and RD).

Table 6
Estimation of BJA program leaks

	2009	2010	2011	2012	2013	2014	2015
Women and children under 2 years of age (in millions)	0.29	0.20	0.21	0.17	0.20	0.23	0.19
Payment of the bonus (in millions of USD)	2.83	11.46	17.03	13.65	20.55	22.70	26.87
Payment of the bonus (in% of GDP)	0.02%	0.06%	0.07%	0.05%	0.07%	0.07%	0.08%
Mothers and children benefited who are not poor according to income criteria (in millions)	0.04	-	0.03	0.02	0.03	0.04	0.03
Mothers and children benefited who are not extreme poor according to income criteria (in millions)	0.06	-	0.05	0.04	0.04	0.05	0.04
Mothers and children benefited who are not poor according to NBI (in millions)	0.02	-	0.02	0.01	0.02	0.02	0.02
Mothers and children benefited who are not chronically poor (in millions)	0.04	-	0.03	0.03	0.03	0.04	0.03
Leaks to non-poor beneficiaries (in millions of USD)	0.35	-	2.32	1.83	2.91	3.57	3.79
Leakages to extreme non-poor beneficiaries (in millions of USD)	0.60	-	3.67	2.96	4.17	5.33	5.86
Leakages to non-poor beneficiaries (in millions de US$)	0.22	-	1.53	1.13	1.95	2.07	2.27
Leakages to chronic non-poor beneficiaries (in millions of USD)	0.42	-	2.74	2.15	3.42	4.18	4.49
Leaks to non-poor beneficiaries (in% of GIP)	0.00%	-	0.01%	0.01%	0.01%	0.01%	0.01%
Leaks to extreme non-poor beneficiaries (in% of GDP)	0.00%	-	0.02%	0.01%	0.01%	0.02%	0.02%
Leakages to non-poor beneficiaries NBI (in% of GDP)	0.00%	-	0.01%	0.00%	0.01%	0.01%	0.01%
Leakages to chronic non-poor beneficiaries (in% of GDP)	0.00%	-	0.01%	0.01%	0.01%	0.01%	0.01%

Source: MEFP, INE and own calculations with information from household surveys.

Finally, the leaks of transfers by RD would have reached 19% of the beneficiaries in 2015, that is, close to 87 thousand elderly (of the million) who received this income would not be in conditions of extreme poverty that justifies their participation, filtration would be 8% of beneficiaries if the moderate poverty level is considered as a criterion. Regarding the fiscal magnitude of the filtration of the DR, this is the most important of the three, due to its importance in terms of the amount of the service, periodicity and number of beneficiaries, which would represent between 0.11% and 0.25% of GDP in 2015 depending on the poverty criterion used as a reference.

Table 7
Estimation of the leaks of the RD

	2008	2009	2010	2011	2012	2013	2014	2015
Beneficiaries (in millions)	0.69	0.77	0.84	0.90	0.96	0.99	1.03	1.07
Payment of the bonus (in millions of USD)	222	239	246	256	266	323	419	432
Payment of the bonus (in% of GDP)	1.34%	1.39%	1.26%	1.08%	0.99%	1.06%	1.28%	1.32%
Beneficiaries who are not poor according to income criteria (in millions)	0.07	0.07	-	0.07	0.09	0.09	0.09	0.09
Beneficiaries who are not extreme poor according to income criteria (in millions)	0.10	0.13	-	0.16	0.17	0.21	0.20	0.21
Beneficiaries who are not poor according to NBI (in millions)	0.05	0.07	-	0.09	0.10	0.12	0.11	0.12
Beneficiaries who are not chronically poor (in millions)	0.08	0.10	-	0.13	0.15	0.18	0.17	0.18
Leaks to non-poor beneficiaries (in millions of USD)	24.03	22.69	-	21.14	24.69	29.22	35.49	35.23
Leakages to non-extreme poor beneficiaries (in millions of USD)	33.86	38.80	-	44.78	47.10	67.99	81.91	83.37
Filters to non-poor beneficiaries NBI (in millions of USD)	17.53	21.14	-	25.64	27.22	39.61	43.20	47.75
Leakages to nOn- chronic poor beneficiaries (in millions of USD)	25.94	31.52	-	37.92	40.55	58.38	69.97	72.75
Leakages to non-poor beneficiaries (in% of GDP)	0.15%	0.13%	-	0.09%	0.09%	0.10%	0.11%	0.11%
Leakages to extreme non-poor beneficiaries (in% of GDP)	0.20%	0.23%	-	0.19%	0.18%	0.22%	0.25%	0.25%
Leakages to non-poor beneficiaries NBI (in% of GDP)	0.11%	0.12%	-	0.11%	0.10%	0.13%	0.13%	0.15%
Leakages to chronic non-poor beneficiaries (in% of GDP)	0.16%	0.18%	-	0.16%	0.15%	0.19%	0.21%	0.22%

Source: MEFP, INE and own calculations with information from household surveys.

If we add the leaks of the three programs in monetary terms, we would have in 2015 a disbursement in terms of monetary transfers of approximately 0.4% of GDP that was aimed at people who were not in poverty. Seeing the problem from a fiscal point of view, having focused the allocation of transfers, the Treasury could have saved up to 0.4 percentage points of GDP in the fiscal result of 2015 that closed with a deficit of 6.9% of GDP.

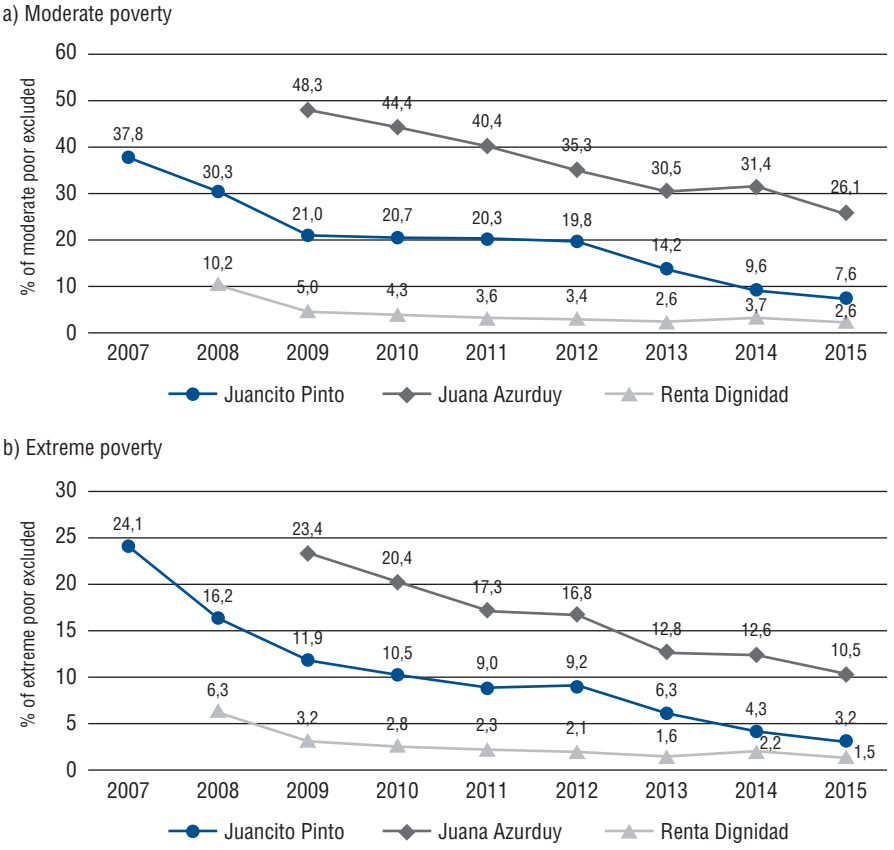
5.2. Exclusions

An additional problem to the filtering of conditional cash transfers is related to exclusions, that is, those people who meet the selection criteria to become beneficiaries, but who for various reasons do not receive the benefits. The consequences of being excluded can be aggravated if the excluded are precisely the poorest people, and that poverty per se constitutes a reason to be excluded, for example, many of the poorest people may lack

documentation to prove their condition as beneficiaries, or due to lack of education or remoteness of the cities to be unable to effect the collection of their benefits.

In the cases of the analyzed transfers, we found heterogeneous exclusion levels in each case and with a tendency to decrease over the years (Graph 6). It can be seen that the BJA is the most excluded, both in the case of moderate and extreme poverty, passing in the first case of almost 48% of the people who meet the criteria for beneficiaries in 2009 up to 26% in 2015, whereas, if extreme poverty is considered, those excluded from the BJA went from 23% to 10%. In second place of exclusion is the BJP, which in its beginnings in 2007 excluded 38% of the potential beneficiaries in the case of moderate poverty and 24% taking into account the extreme, these percentages fell to 7.6% and 3.2% in 2015, respectively. Lastly, the RD is the benefit that would be least excluded, with 10.2% of the moderate poor excluded and 6.3% of extremes in 2008, rising to 2.6% and 1.5% at the end of 2015.

Graph 6
Exclusions in the BJP, BJA and RD programs according to different poverty criteria



Source: Own elaboration with information from household surveys.

The decreases in the exclusion can be associated to the reduction of the levels of poverty between the years of the boom of prices of commodities, as well as to logistical improvements in the administration of the programs, with greater diffusion and communicational reach to be able to reach a population more numerous. Similarly, the high level of exclusion in the case of BJA relative to the other transfers coincides with the country's high maternal mortality (206 deaths per 100,000 live births in 2015), where many women, especially in rural areas, still they do not have the material conditions (hospitals, means of transport), or human capital (education) to be able to carry out a pregnancy and delivery process in conditions that guarantee their health and their children health.

6. Impact of transfers on poverty and inequality

As previously indicated, the monetary transfer programs in Bolivia emerged with the objective of reducing poverty and inequality in the country. This section focuses on analyzing the impact of monetary transfers on poverty and income distribution, through a simple allocation analysis and following the methodology used in Robles et al. (2015). The objective of this section is to analyze the impact of these programs on the level of poverty and inequality observed in Bolivia at the beginning of the allocation of transfers.

Bolivia has registered significant social advances, reducing the incidence of poverty, mitigating inequalities and geographic and social gaps, characteristic of the country (Castellani & Zenteno, 2015). In the period 1996-2015, moderate poverty was reduced from 65% to 39% of the population and extreme poverty went from 41% to 17%. As for the Gini[16] Index, it went from 0.59 to 0.47, decreasing from 0.61 to 0.52 in the rural area and from 0.51 to 0.42 in the urban area. (Graph 7).

6.1 Poverty

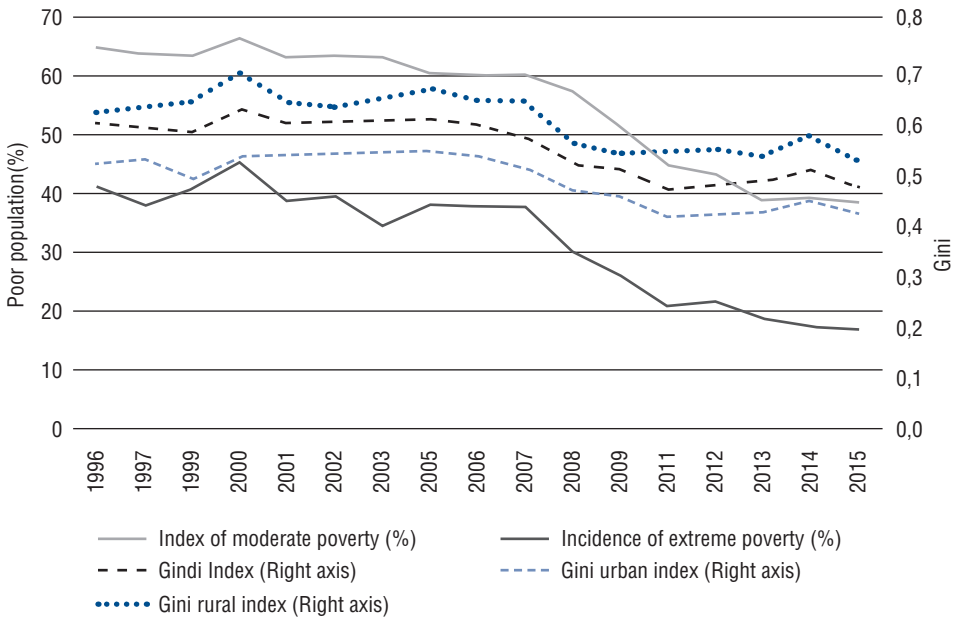
In terms of poverty in Bolivia, this has been reduced continuously since 2000 and accelerated since 2006. Analyzing by geographic area, the decrease has been more pronounced in rural areas (Castellani & Zenteno, 2015). Although there are studies that analyze the impact of social transfers separately on poverty, Escobar et al (2013) in the case of RD, Vidal et al. (2015) in the case of BJA and Villalobos & Moreira (2013) in the case of the BJP, to date there has not been a joint analysis of the impact of transfers on the level of poverty and extreme poverty.

The first step in measuring poverty is to identify the point from which a person is defined as poor (Haughton & Khandker, 2009). This section uses the line of poverty and the line of extreme poverty officially defined in Bolivia by the INE. The use of these poverty indicators for the present analysis is explained by its simplicity in comparison to the poverty indicator by NBI, which would require the use of several assumptions that

16 Recall that a Gini coefficient equal to 1 indicates absolute income inequality, while a coefficient of 0 would show total equality in the distribution of income.

allow to approximate the process of access to housing, health, services and basic supplies and education.

Graph 7
Poverty and inequality in Bolivia



Source: Own elaboration with UDAPE data. Statistics Dossier Vol.26.

The calculation of the impact of transfers on moderate poverty is carried out under the following analysis: the monthly impact (in income) of the transfer of each of the three analyzed programs is estimated, assuming that all those potential beneficiaries of the program have received the benefit. For the calculation of the monthly amount of each transfer, the methodological notes explained in section 4 are followed. Based on these imputed monthly monetary income for each of the transfers, a net transfer income is calculated (counterfactual) for all those potential beneficiaries of the programs. As previously noted, our estimates of the impact on poverty and inequality would be overestimated.

As shown in Table 8, the level of poverty in Bolivia was reduced from 60% to 39% between 2005 and 2015, which implies a reduction of 2.2 pp. in the level of poverty per year, being that the reduction of poverty was more pronounced between 2008 and 2009, where it was reduced by almost 6 pp. If we analyze the evolution of poverty in the absence of monetary transfers, it would have been reduced from 60% to 42%, which is 3 pp. above what is actually observed, which is equivalent to a reduction of up to 8% in the level of moderate poverty. It is worth noting that the estimated impact of transfers was greater in 2015.

Table 8
Moderated Poverty

Year	Real (%)	Counterfactual without/ transfers (%)	Variation in Poverty per income	
			pp.	In %
2005	59,63	59,63	-	-
2006	61,35	59,63	-1,72	-3%
2007	61,45	63,99	2,54	4%
2008	57,45	60,03	2,58	4%
2009	51,46	54,31	2,85	6%
2011	45,06	48,07	3,01	7%
2012	43,55	45,80	2,25	5%
2013	39,22	41,60	2,38	6%
2014	39,40	41,95	2,55	6%
2015	38,64	41,71	3,07	8%

Source: Own elaboration based on data from the Household Surveys 2006 - 2015.

Table 9
Extreme Poverty

Year	Real (%)	Counterfactual without/ transfers (%)	Variation in Extreme Poverty per income	
			pp.	In %
2005	36,69	36,69	-	-
2006	35,58	37,36	1,78	5%
2007	39,39	41,29	1,90	5%
2008	30,34	34,14	3,80	13%
2009	26,29	30,02	3,73	14%
2011	21,02	23,72	2,70	13%
2012	21,83	24,8	2,97	14%
2013	19,04	22,62	3,58	19%
2014	17,45	20,7	3,25	19%
2015	16,96	20,11	3,15	19%

Source: Own elaboration based on data from the Household Surveys 2006 - 2015.

Table 9 presents the calculation of the level of extreme poverty; the data show that extreme poverty would have been reduced from 37% in 2005 to 17% in 2015. This implies an average reduction of 1.9 pp. per year and that showed its greatest reduction between 2008 and 2009 (4 pp.). If we analyze the evolution of poverty in the absence of monetary transfers (counterfactual), extreme poverty would have been reduced from 37% to 20%, which implies that the impact of monetary transfers on extreme poverty would be up to 4pp. what amounts to a reduction of up to 19% in the level of extreme poverty.

As can be seen, according to the simulations carried out for the period analyzed, the impact of the monetary transfers would have been up to 3pp. in the case of moderate poverty and up to 4 pp. In the case of extreme poverty, it is interesting to note that these differences are framed in the findings of the studies previously cited with respect to the impact on the level of poverty.

6.2 Inequality

Regarding the variations in inequality in Bolivia, the existing studies that have tried to explain the reduction of inequality in the period analyzed have not found significant evidence that the transfers have been the cause of the reduction of these indicators. . Canavire & Ríos (2015) and Vargas & Garriga (2015) find that the variation in inequality between 2002 and 2012 would be explained basically by an increase in the labor income of the lower part of the distribution, while the salaries of the upper part showed improvements, a fact that would be attributable mainly to the increase of the minimum wage and not to the transfers of the government. Similarly Hernani & Eid (2013) analyze the causes of the decrease in inequality in urban areas of Bolivia, finding that the observed changes in inequality could be explained by changes in the distribution of labor income, where neither monetary transfers, nor would remittances significantly explain the observed changes. This phenomenon is consistent with the fact that labor income accounts for an average of 87% of household income.

Unlike the concept of poverty analyzed above, the notion of inequality is much broader, since it is defined in terms of the entire population and not only of a particular group (Haughton & Khandker, 2009). The economic literature has shown that increases in inequality can have an impact on poverty reduction in a country (Ravallion, 2001). Particularly the reduction of inequality allows greater opportunities to progress in life to the most vulnerable population (Scanlon, 2014). The fight against economic inequality also allows: i) preventing a particular group from obtaining unacceptable control over natural resources, the media or other factors; ii) take care of the impartiality of the political institutions; iii) prevent the deterioration of the economic system itself, seeking to provide the same opportunities for people with fewer resources and their families, in terms of education, health or employment, seeking to eradicate the vicious circle of poverty; finally, iv) the workers, as participants of the production system that generates the national income, have the right to demand a fair share of what themselves have helped produce, that is, their income should grow at the same rate as the income of who use them.

There are many ways to measure inequality in a country[17]. This section of the document focuses particularly on analyzing the impact of the three transfers analyzed (RD, BJP and BJA) on two measures of inequality.

The first measure used corresponds to the income dispersion ratio. Dispersion ratios are the simplest and most popular ways to measure inequity. The advantage of this indicator is its easy interpretation, although it ignores information regarding the

17 There are 4 properties that inequality measures should comply with: 1) Symmetry; 2) Invariance due to variations in the size of the population; 3) invariance of scale and; 4) Principle of transfer.

distribution of income in the rest of the distribution. For this reason,[18] the analysis of income ratios is presented as the income average of the richest 75% in relation to the income of the poorest 25%.

The second indicator analyzed is the Gini Index. This index, based on the Lorenz curve, measures the degree of inequality in the distribution of income. The indicator is constructed as the accumulated percentage of income compared to the accumulated percentage of the distribution of households. The Gini index takes values between 0 and 1, where a coefficient of 0 indicates total equality in the distribution of income, while a coefficient equal to 1 indicates an absolute[19] income inequality.

The calculation of the impact of transfers on inequality measures follows the methodology described for the analysis on poverty and moderate poverty.

6.2.1. Income dispersion rate

In the first indicator analyzed, the income ratio of the 75th percentile over the 25th percentile is presented. As shown in Table 10, the income difference was reduced from 4.26 to 3.43 between 2006 and 2015. This variation implies that in 2006 the 75th percentile of the population had an income 4.26 times larger than the 25th percentile, while in 2015, the 75th percentile received an income 3.43 times higher than the income of the 25th percentile, transfers, the change in the ratio would have gone from 4.26 in 2006 to 3.46, a much smaller and stable variation, which represents only an improvement of up to 5% in the best of years.

Table 10
Income rate P75 / P25

Year	Real	Counterfactual without/ transfers (%)	Variation in the P75-P25 Ratio	
			In value	In %
2005	6,926	6,926	-	-
2006	4,264	4,321	0,06	1%
2007	3,951	3,926	-0,02	-1%
2008	3,712	3,882	0,17	5%
2009	3,68	3,723	0,04	1%
2011	3,422	3,526	0,10	3%
2012	3,653	3,704	0,05	1%
2013	3,693	3,751	0,06	2%
2014	3,73	3,911	0,18	5%
2015	3,431	3,469	0,04	1%

Source: Own elaboration based on data from the Household Surveys 2006 - 2015.

18 This indicator is the only one that does not meet the four axioms desired for inequality indexes.

19 Additionally, for the analysis of this document, a third measure of inequality was included, the Theil Index, which presents results similar to those found through the Gini Index and are available upon request.

6.2.2. Gini Index

Continuing with the study of other indicators of inequality, we analyzed the Gini index. According to our calculations and according to household surveys, the Gini index went from 0.56 in 2006 to 0.47 in 2015, where the calculated impact of transfers on inequality would have been very small in the period analyzed and that would be explaining in the best of cases up to 3% of the variation of the index. As can be seen in Table 11, the improvement in the Gini index is almost imperceptible in 2006 and 2012.

Table 11
Gini Index

Year	Real	Counterfactual without/ transfers (%)	Gini Index Variation	
			In value	In %
2005	0,6312	0,6312	-	-
2006	0,5548	0,5542	0,00	0%
2007	0,5456	0,5485	0,00	1%
2008	0,5141	0,5241	0,01	2%
2009	0,5023	0,5125	0,01	2%
2011	0,4703	0,4785	0,01	2%
2012	0,4806	0,4875	0,01	1%
2013	0,4983	0,5107	0,01	3%
2014	0,4967	0,5072	0,01	2%
2015	0,4747	0,4812	0,01	1%

Source: Own elaboration based on data from the Household Surveys 2006 - 2015.

Following the analysis, and to graphically analyze the impact of the transfers on the Gini index, the Lorenz curve for 2006 and 2015 is presented below, where the observed curve and a counterfactual curve are plotted in absence of transfers. As can be seen in Figure 8, the variations in the Lorenz curve, as well as the variations observed in Table 12, are very small and almost imperceptible in both 2006 and 2015.

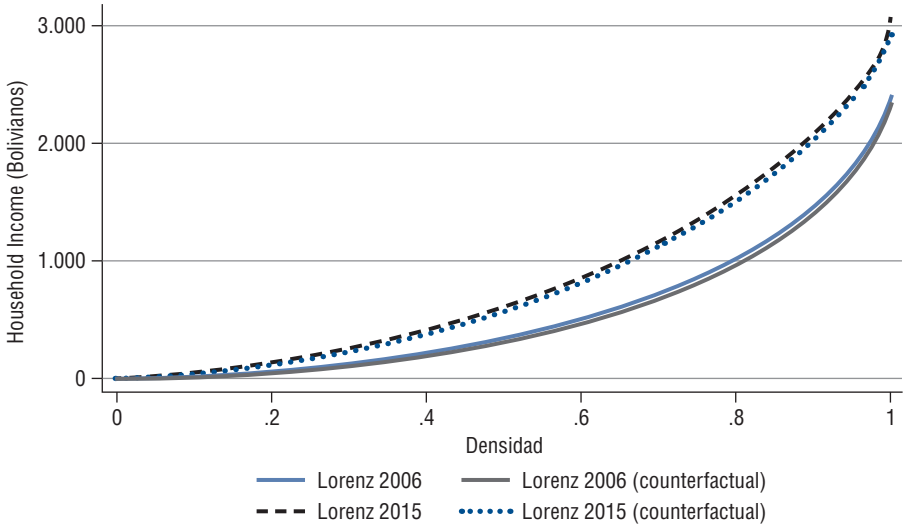
6.2.3. Percentage variation of household income

Next, the percentage variation in the income of each percentile of the population between 2006 and 2015 is presented. Following the analysis developed so far, the percentage change in income observed in the period and the change in the absence of associated income are shown to monetary transfers (counterfactual).

As can be seen in Figure 9, between 2006 and 2015 in Bolivia, there was greater growth in the income of the poorest households. For the first quintile of the population, the variation of their income was higher than 100%, while the other quintiles showed more modest variations for the percentiles with higher income. In annual terms, it is observed that the first quintile of the population (Table 12) had an annual variation of their income of 12% on average, the second quintile a positive variation of 8% per year,

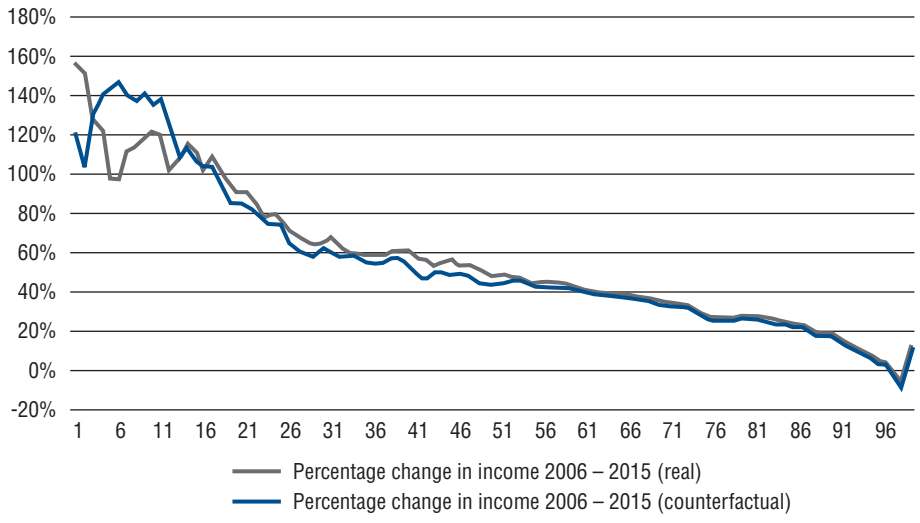
the third quintile a variation of 6%, the fourth quintile a 4% and the richest quintile an annual variation of 2%.

Graph 8
Lorenz curve 2006 and 20015



Source: Own elaboration with data from household surveys.

Graph 9
Percentage Variation of Household Income between 2006 and 2015



Source: Own elaboration based on data from the Household Surveys 2006-2015.

Reviewing the annual variation in the absence of monetary transfers (counterfactual), we see that the change in the period analyzed would have been similar to that observed, under the same logic of greater variations for the poorest households. Annually, the variations by quintile would have been similar to those observed, with a variation of 13% for the first quintile, 7% for the second quintile, 5% for the third quintile, 4% for the fourth quintile and 2% for the quintile richest (Table 12).

Table 12
Annual Percentage Variation of Household Income by Quintiles

	Percentage change in income 2006 - 2015 per year (Real)	Percentage change in income 2006 - 2015 per year (Counterfactual)
Quintil 1 (poorest)	12,20%	12,90%
Quintil 2	7,70%	7,20%
Quintil 3	5,60%	5,10%
Quintil 4	3,80%	3,70%
Quintil 5 (richer)	1,70%	1,60%
Average	6,20%	6,10%

Source: Own elaboration based on data from the Household Surveys 2006-2015.

This result is consistent with what was found by Canavire & Ríos (2017) and by Vargas & Garriga (2015) where the impact associated with the reduction of inequality would be explained by a greater growth in the income of the poorest households compared to the stagnation of the income of the richest households, which, as can be seen in both Figure 9 and Table 12, would not be explained by the social transfers analyzed.

7. Alternatives

As demonstrated above, the leakage of transfers to the non-poor generates inefficiencies in at least two aspects, the fiscal burden and the reduction of poverty and inequality. For this reason, a more efficient allocation of resources would allow maintaining or improving the observed results without implying greater fiscal burdens in a context of less favorable income.

It is possible to estimate that for the particular case of the BJP, in 2006 there were around 1,396,006 potential beneficiaries following the allocation criteria defined by the program and explained in section 3.2. However, of these only 76% met the criterion of moderate poverty and only 48% met the criterion of extreme poverty. By 2015, there were around 1,946,576 potential beneficiaries, of whom 51% met the criterion of moderate poverty and only 24% with the criterion of extreme poverty (Table 13).

For the BJA, in 2011 there were around 141,468 potential beneficiaries, of which 55% were poor and only 30% were extreme poor, as in the case of the BJP, in 2015 50% were poor and only 22% were poor, cataloged as extreme poor.

Finally, as regards the DR, in 2006 of the 440,000 potential beneficiaries (approximately 9% of the total population), 56% were poor and only 25% were extreme poor. In 2015,

of the million potential beneficiaries, 35% would correspond to the category of moderate poverty and only 15% with a criterion of extreme poverty.

Table 13
Eligible beneficiaries for transfers under targeting schemes (people)

		2006	2007	2008	2009	2011	2012	2013	2014	2015
BJP	Potential beneficiaries	1,396,006	1,406,288	1,835,900	2,008,297	2,067,919	2,148,381	1,968,227	2,101,347	1,946,579
	Beneficiaries in situation of moderate poverty moderate	1,058,387	1,066,423	1,340,444	1,358,513	1,260,906	1,232,136	1,079,726	1,102,085	996,707
		76%	76%	73%	68%	61%	57%	55%	52%	51%
	Beneficiaries in situations of extreme poverty	667,233	745,768	789,437	759,036	644,839	673,829	579,657	529,227	458,608
		48%	53%	43%	38%	31%	31%	29%	25%	24%
BJA	Potential beneficiaries					141,468	348,186	238,622	327,451	298,375
	Beneficiaries in a situation of moderate poverty					78,110	187,260	101,869	152,773	149,016
						55%	54%	43%	47%	50%
	Beneficiaries in a situation of extreme poverty					42,450	102,281	43,631	67,286	65,455
						30%	29%	18%	21%	22%
RD	Potential beneficiaries	440,015	521,143	742,036	823,235	877,752	940,711	1,104,989	1,000,917	1,071,616
	Beneficiaries in a situation of moderate poverty	248,259	302,593	339,737	349,723	321,979	398,139	406,437	355,728	379,154
		56%	58%	46%	42%	37%	42%	37%	36%	35%
	Beneficiaries in a situation of extreme poverty	109,689	175,438	153,208	137,092	147,947	207,667	175,108	145,845	166,020
		25%	34%	21%	17%	17%	22%	16%	15%	15%

Source: Own elaboration with data from household surveys.

In this sense, and continuing with the previously proposed analysis to quantify the impact associated with the inclusion of focalization processes in the transfers that would allow the allocation to only reach the people who need it most, a simulation of resource allocation is proposed only towards poor households in the first instance (scenario 1) and later only towards extreme poor (scenario 2), in both cases it is assumed that fiscal spending had remained constant, without reducing disbursements by transfer. It is true that the simulation assumes the possibility of a perfect focus on poor families and extreme poor, a fact that is not verifiable and achievable, however, and as with the calculations made in the previous section, the exercise would correspond to the optimal scenario achievable, being that any movement in this direction would imply improvements in the Pareto sense (Table 14).

Table 14
Amounts of annual transfers under targeting schemes (In Bs.)

		2006	2007	2008	2009	2011	2012	2013	2014	2015
BJP	Effective amount	200	200	200	200	200	200	200	200	200
	Amount targeted by poverty (scenario 1)	265	267	265	295	326	345	396	399	416
	Amount targeted by extreme poverty (scenario 2)	375	413	375	514	625	651	842	946	994
BJA	Estimated cash amount					611	598	750	669	620
	Amount targeted by poverty (scenario 1)					1,327	1,097	1,475	1,405	1,385
	Amount targeted by extreme poverty (scenario 2)					2,422	2,057	3,887	3,590	3,446
RD	Estimated cash amount	2,266	2,278	2,284	2,293	2,289	2,287	2,861	2,879	2,874
	Amount targeted by poverty (scenario 1)	4,236	4,111	4,645	5,271	5,815	5,586	10,069	9,442	9,304
	Amount targeted by extreme poverty (scenario 2)	11,259	7,756	9,365	12,392	12,983	10,900	10,900	25,000	22,196

Source: Own elaboration with data from household surveys.

Under this analysis, it is possible to calculate the amount of the transfer that could be granted in the case of targeting it only for the poor and extreme poor. As can be seen in Table 15, a focus of the BJP towards only poor people would have meant in 2006 a transfer of Bs.265 and in the case of a transfer to extreme poor of Bs.375 in relation to the current amount of Bs. 200. This amount would have increased to Bs.416 in 2015 if the benefit was focused on the moderate poor and Bs.994 if it were focused on the extreme poor.

In the case of the BJA, according to data from the household surveys it is estimated that on average the beneficiaries of the transfer received around Bs.620 annually in 2015, it would have reached Bs.1,385 in the case of being focused only towards the poor and Bs.3,446 if it had focused on extreme poor.

In the case of the DR, considering that the transfer is the one that grants a greater amount of money annually, it is estimated based on data from the household survey that the beneficiaries receive approximately Bs.2,874 annually (approximately Bs.239 per month) with the 2015 scheme and would have received Bs9,304 annually (approximately Bs. 775 per month) if it was targeted for the poor and Bs. 22,196 if it were focused on extreme poor (approximately Bs. 1,850 per month, close to a current minimum wage).

Under this scenario it is possible to propose the change that would have been observed in the evolution of poverty, extreme poverty and inequality in a scenario of targeted transfers for the two cases described, for a relevant issue, only the analysis for 2014 is presented and 2015 in Table 15.

Table 15
Hypothetical poverty and inequality levels under targeting schemes

Year	Poverty			Extreme Poverty			Inequity (Gini)		
	Real	Focusing the poor (Scenario 1)	Focusing the extreme poor (Scenario 2)	Real	Focusing the poor (Scenario 1)	Focusing the extreme poor (Scenario 2)	Real	Focusing the poor (Scenario 1)	Focusing the extreme poor (Scenario 2)
2014	39.4	38.49	39.36	17.45	15.80	16.40	0.497	0.486	0.463
2015	38.64	38.46	39.52	16.96	15.62	15.86	0.475	0.464	0.451

Source: Own elaboration with data from household surveys.

Under a scheme of targeting the poor and extreme poor (scenario 1 and scenario 2) it is observed that the level of poverty has remained constant in relation to what is actually observed, with a poverty rate of around 39%. On the other hand, when analyzing the impact on extreme poverty, it is observed that the targeting would have implied a reduction of extreme poverty between 1pp. and 1.7pp (approximately an 8% reduction) compared to what was actually observed. Finally, under a targeting scheme, there would also have been improvements in the Gini index, which would have been around 2% in Scenario 1 and 6% in Scenario 2.

8. Conclusions and recommendations

The study arrives at several interesting conclusions, among which the efficiency of transfers - understood as the delivery of monetary resources to poor people - depends on the criteria used to catalog the type of poverty, on the other hand, the document concludes that money transfers would not have had an important effect on the reduction of levels of inequality and poverty, the effects of labor income growth prevailing when explaining this phenomenon (Vargas & Garriga, 2015), and that the filtered resources of the transfers represent amounts close to 0.5pp of GDP.

Regarding the first point, we observed that the monetary transfers would be more oriented towards the poor or non-poor beneficiaries depending on the poverty criterion chosen for the estimation, having as opposite situations the criteria of extreme poverty and NBI. In the first, we see that practically all three programs would be inefficient, because they would be benefiting people who would not be in extreme poverty, due to the small proportion of the population that would fall into this category of poverty, the opposite occurs with the NBI, where when confronting a poverty criterion of structural type, almost all the beneficiaries of the programs would be contemplated in this definition of poverty, giving rise to a high efficiency of the programs, as they maintain the authorities that defend the non-focalization of transfers. In the future, the research challenge consists in evaluating the relevance of each category of poverty, to define what kind of poverty would be most urgent, through transfers, for example.

The exercise also shows that both the DR and the BJP would be the programs that offer the greatest opportunity for leaks, in the first case because there is only the age limitation to become a beneficiary, so the probability of having a greater number of elderly beneficiaries who do not really need the transfer is higher, at the same time, this would be the most important filtration in monetary terms, due to the high provision and its higher periodicity compared with that of the other programs. Regarding the BJP, the conditions of being enrolled in a fiscal education unit and having a minimum annual attendance are not sufficient elements to ensure that the beneficiaries are the neediest students, since there is great heterogeneity in the students who attend units, public education, making this transfer also have a significant degree of leaks. Finally, we observed that the BJA would be the least susceptible to leakage thanks to the condition of not being affiliated with any health insurance to become a beneficiary, a condition that would be guiding access to the transfer to the most vulnerable women, although this would not materialize necessarily in all cases, as could be observed in view of the high level of exclusion that this program presented, especially in its beginnings.

With regard to the analysis of the effect of monetary transfers on poverty and inequality indicators, the document concludes that there is evidence of a meager effect on the improvement of these indicators and that they can be explained by the distribution of monetary transfers, which would reach a maximum of 4pp in the case of extreme poverty and 3% for the Gini coefficient, in this sense, and after studying a variety of indicators related to poverty and inequality we conclude, coinciding with other studies, that the improvements observed in the indicators, social benefits are largely the result of higher labor incomes of workers with lower skills as a result of the commodity price boom, and not because of the effects of the redistribution of monetary income through social programs.

Regarding policy alternatives, the analysis shows that efficiency could be gained if the decision were made to focus the transfers towards people in poverty, for example, the amount of the benefit could be increased to Bs.416 in the case of the BJP, Bs.1,385 BJA and Bs.9.304 in the DR if it were chosen to focus benefits towards the population in moderate poverty. On the other hand, these reallocations would also allow a certain improvement in the poverty and inequality indicators, between 1pp. and 1.7pp in the case of moderate poverty and between 2% and 6% in the case of the Gini indicator, although these improvements do not seem completely substantial either, if compared with the effects that a potential increase in labor income could have, as was the case during the boom.

Finally, when quantifying the magnitude of leaks and exclusions for 2015, it is observed that there are approximately USD 124 million (0.4% of GDP) in terms of leaks, a figure that becomes important if you take into account that since 2014 The fiscal balance of the country has been affected by the end of the super-cycle of prices of raw materials, and that in 2015 implied a fiscal deficit of 6.9% of GDP. The efficiency of public expenditures, including those of cash transfer programs, becomes fundamental in an environment with limited prospects for the recovery of commodity prices in the medium term.

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The relationship between natural resources and local human development: signs of curse or blessing?

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Abstract

This document aims to explore whether the exploitation of hydrocarbons was related to the improvement of indicators of human development in Bolivia. Census and administrative data are used to describe the differences between producing and non-producing gas municipalities in relation to receiving government transfers and human development indicators. Then the transfers from the central government are included in the comparison as a more specific channel of state action. A positive relationship was found between production and access to health and education when the comparison is at a national level; however, there is no evidence of a better situation when the comparison group is departmental or provincial. The relationship is maintained when government transfers are included, which in most cases have a complementary effect. The results contribute to the literature on the long-term effects of the exploitation of natural resources on development in a context of decentralization.

Keywords: Hydrocarbons, Decentralization, Human Development.

1. Introduction

In this document an analysis is made of the possible effects of hydrocarbon production on human development based on indicators of access and use of health and education services; and about employment as an income approach. The research tries to distinguish the channel of transfers obtained from the central government (hereinafter, vertical transfers or simply transfers) from the rest of possible ways in which the production of hydrocarbons affects human development.

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This analysis is relevant for Bolivia given the importance of the hydrocarbon sector in the Bolivian economy during the period from 2005 to 2012. In 2001, before the super-cycle, gas production corresponded to 20% of exports, a figure that was growing in later years. For 2012, this figure reached 46%, constituting an important source of foreign currency. In view of the imminence of an increase in the prices of hydrocarbons, the government decided to appropriate the new revenues generated and approved the Hydrocarbons Law 3058 promulgated in 2005, and the so-called "nationalization" in 2006[2].

Bolivia is characterized by being a country dependent on natural resources. However, the last cycle of high prices occurred in a new context of administrative decentralization, a particularity of public administration that was not present in the seventies. As a consequence, the direct tax on hydrocarbons (IDH) has become one of the main sources of income for municipalities. Between 2005 and 2012 this tax has come to contribute up to 50% of the transfers received by some municipalities. By the way, concerns have arisen that this situation may have triggered more pronounced rentiers practices (Laserna, 2009), with the corresponding consequences for long-term growth (Evia, Laserna and Skaperdas, 2008). It is for this reason that it is natural to ask whether these greater transfers are a channel through which hydrocarbon production translates into greater economic development.

The current investigation approaches the effect on economic development from one of its important causes: human development. The results show that gas production is related to greater access and utilization of health services and greater access to education services. However, these differences are mainly at the national and departmental levels. It is also evident that the production of gas does not imply greater transfers for the producing municipality. On the other hand, it is shown that municipal transfers were an important channel in improving access and use of health services; which complemented the rest of the aggregate channels in the production of hydrocarbons.

The document is structured as follows, the second section describes the literature on the relationship between abundance of natural resources and economic development. The third section introduces some important observations about the Bolivian context, while the fourth section describes the methodology and makes a description of the data. The results are described in the fifth section and the sixth section presenting the main conclusions reached by the document.

2. Relationship between abundance of natural resources and economic development

The relationship between natural resources and economic growth has been the object of constant study. Much of the research that addresses this issue has focused on determining whether the abundance of natural resources affects economic growth positively or negatively. These studies mainly use a cross-sectional analysis comparing the levels of

2 According to calculations made by Medinaceli (2016), nationalization meant an income of 16% of hydrocarbon production, while the HDI collected 32% of said production.

natural resources and gross domestic product of a group of selected countries (Sachs & Warner, 1995, Sachs & Warner, 2000, van der Ploeg, 2011).

Most of the empirical evidence has demonstrated the existence of a negative relationship between the abundance of natural resources and economic growth (Sachs & Warner, 1995, Sachs & Warner, 2000). These results have reinforced the hypothesis of the existence of the "curse of natural resources". This establishes that, due to different dynamics caused by the presence of natural resources, economies with abundant amounts of such resources experience lower rates of economic growth.

Among the main dynamics that would explain this phenomenon are the absence of positive externalities coming from the exploiting sectors of natural resources, in comparison with the externalities generated in the manufacturing sectors (Sachs & Warner, 2000). This result is also associated with the so-called "Dutch Disease" where the exploitation of natural resources would increase the terms of trade, affecting the competitiveness of the other export sectors, generating a deindustrialization process (Sachs & Warner, 1995).

Another important channel lies in the loss of institutions that natural resources can generate. The behavior of rent seeking brings with it many problems of corruption that end up weakening the institutions of the countries, affecting even the democratic levels of the same (Carreri & Dube, 2014, Larrain & Perello, 2017, Boschini et al., 2013). In this line, Acemoglu and Robinson (2012) establish that the creation of extractive institutions in Latin America during the colonial era would be one of the main causes of the low level of use of rents generated by natural resources.

Although there is a wide body of evidence that corroborates the existence of a curse of natural resources, there are also many reasons to believe that the rents of natural resources should contribute to the development of economies, mainly because higher rents mean a higher margin for public investment in goods and services, such as education, health, infrastructure, transfers to households, among others (van der Ploeg, 2011, Caselli & Michaels, 2014). Following this line, Smith (2015) finds causal evidence of the long-term effects of the discovery of hydrocarbons on the development of the countries. The author shows that this relationship is more important if there is a lower level of initial development and lower amount of population. He also mentions that the existence of hydrocarbons improves GDP per person, especially in developing countries. The channel that follows this influence is studied from some proximal causes of development as the long-term positive effect on the formation of human capital, productivity, labor force and education

The studies carried out during the last decade have focused on analyzing the internal dynamics at the local level in different countries, in order to determine the causes of the high or low use of income from the extractive sectors and their influence on economic development. One of the characteristics that differentiates the study of sub-national entities and studies between countries is that certain variables such as the quality of the institutions, necessary to attract financing, and the degree of corruption remain constant for an entire country (Loayza & Rigolini, 2016). This allows a better control of the bias due to omitted variables that may be present in cross-country studies (Carreri & Dube, 2014).

Studies at the local level have focused mainly on the analysis of the effects of mining and hydrocarbons. Based on the analysis focused on mining, Aragon and Rud (2009) find positive effects of the Yanacocha mine located in Peru. The main result of his document attributes the positive effects of mining to the increase in demand for local inputs generated from mining facilities. Evidence an increase in the income of localities that are closer to the mine analyzed. On the other hand, Loayza and Rigolini (2016) evaluate the effect of the mining operation on inequality within and between districts in Peru. Among the main objectives of its study is to separate the contribution of different channels to this change, especially the effect of the mining canon. One of the main results reached by the authors is that mining reduces poverty and increases inequality. Like Aragon and Rud (2009), these authors affirm that the main channel is the increase in economic activity while the contribution of the distribution of resources is not significant. However, Loayza and Rigolini (2016) do not find signs of externalities to nearby districts from producing districts.

The municipal analysis in Bolivia carried out in this document contributes to the literature that studies the relationship of the exploitation of hydrocarbons on local economic development, identifying the importance of vertical transfers as one of the channels of redistribution of resources from the state. Previous work in the area has shown that institutionally is a determining variable of the results that can be obtained by taking advantage of the income from public hydrocarbons for the inhabitants. This result is attributed mainly to the corruption existing in the neighboring country.

As the literature in the area emphasizes, the impacts generated by oil revenues will depend, on the public policies adopted by the government and on the other hand on how the economy responds to the imbalances generated by these gains. A fundamental variable is the level of absorption of the resources generated from natural resources that the country has, it will depend on the production policies related to the extraction rate, the decisions on public investment to be made with said resources, the sector in which they are invested, the method of transfers that the government uses, among others (Gelb, 1988). That is why having a solid institutional framework allows a high level of appropriation of income from natural resources, allowing countries rich in minerals, hydrocarbons and others, to use the exploitation of them as a mechanism to improve the quality of life of its inhabitants and thus avoid the curse of natural resources[3] (de Medeiros Costa & dos Santos, 2013, Boschini et al., 2013).

There are indications that Bolivia could be facing a scenario of curse of natural resources. Evia, Laserna and Skaperdas (2008) analyze the influence of social conflicts, generated mainly by rentism, on Bolivian economic growth. The authors affirm that the conflict affects economic growth in different ways, among the most relevant are the economic costs generated by conflicts, which translate into a deterioration of production,

3 Regarding the presence of a possible curse / blessing of natural resources in Bolivia, Barja and Zavaleta (2016) conclude that the mining sector seems to behave more in line with the literature of Dutch Disease and the curse of natural resources. In contrast, the hydrocarbon sector could be an opportunity for economic growth if the resources coming from that sector are well managed.

consumption and investment. A second way is the distortions to incentives that introduce the conflicts, the generated distortions would be affecting mainly to the production by means of the investment and the innovation. A third channel between conflicts and growth lies in the damage generated towards institutions, governance and property rights. The authors conclude that the conflicts have meant an important loss for the country in terms of growth. They also show that most conflicts arise when there are changes in the terms of trade, which are mainly caused by increased prices of exported raw materials. This document uses data at the municipal level to understand another channel that could generate evidence in opposite direction. Census and administrative data are used to study the relationship between hydrocarbon's production, increase in income from transfers received by municipalities and human development.

3. Bolivian context: distribution of fiscal resources towards municipal governments

The Bolivian context is characterized by a process of decentralization that began in the nineties. Currently, Bolivia has a political and administrative organization that consists of three levels: central government, departmental governments (9) and municipal governments (337). While the decentralization of competences to departmental autonomous governments is a relatively recent event; the municipal governments in Bolivia began this process as of 1994. An important source of financing since then has been the tax co-participation from the central government, which is distributed according to population and poverty criteria. The central government is responsible for collecting the taxes with the highest tax pressure, while the collection of most of the municipalities is scarce. Despite this lack of ability to produce own revenues, it has been shown that, on average, decentralization had a positive effect on the development of municipalities in Bolivia (Faguet, 2016). This is related to a change in spending preferences. Whereas in earlier times greater attention was paid to national public goods (i.e. fundamental road network), as of 1994, municipalities in general have invested a greater amount of their budget in local public goods such as education and health (Faguet, 2016).

Given this initial situation, one of the most important changes of the analyzed decade (2001-2012) occurred in 2005, when the revenues generated by the exploitation of natural resources [4]for the first time began to be distributed to municipal governments. Before that year, the main form of income distribution was departmental royalties. However, these were controlled by the departmental prefectures that were chosen by the central government. As of 2005, the Hydrocarbons Law (Law No. 3058 of May 17, 2005) and its regulations stipulate the instruments by which the government appropriates part of the hydrocarbon revenues and the way in which they reach the municipalities.

The Direct Tax on Hydrocarbons (IDH) is the main source of distribution to municipal governments. The purpose of this tax is to cover the investment needs in education,

4 This section is based on the revision of Hydrocarbons Law No. 3058, DS 28223, DS 28333 and DS 28421.

health and infrastructure. It establishes an aliquot of 32% based on the production value at the national level. This collection is distributed as follows: each producer department (Cochabamba, Chuquisaca, Tarija and Santa Cruz) receives at least 6.25%, which amount will be increased if there is a higher production. Meanwhile, the non-producer departments each receive 6.25% of the total collection. Of the amount received by each department, 34.48% is distributed to the municipal governments under a population criterion. Additionally, 5% of the collection by IDH is used to compensate the departments with the largest population: La Paz, Cochabamba and Santa Cruz; of which 80% is destined to its municipalities. In addition to the HDI, 50% of the collection for exploitation patents is transferred to the producing municipalities according to the extension of the exploitation concessions and development phase. In addition to the HDI, the producing departments benefit from a royalty of 11% of departmental production. The departments of Beni and Pando for their part benefit from a compensatory royalty of 1% on national production and the central government of a royalty of 6% on total production. In total, this system ensures that the state appropriates at least 50% of the value of hydrocarbon production, without counting direct participation through the state company.

4. Methodology and description of the data

One of the challenges assumed at the moment of conducting the present investigation is not having detailed data on gas production in all the wells of the country. The officially distributed statistical information only provides information on the production of the 10 most important fields, which represent only 9.37% of the identified wells.

As a hydrocarbon production proxy, the number of exploration and exploitation wells in each municipality is taken into account. In the case of wells that fall into the border, they are attributed to all the municipalities that share limits in said well. The data used is periodically[5] updated based on the Hydrocarbons Cadastral System of the Plurinational State of Bolivia, which to date has registered 2,403 wells.

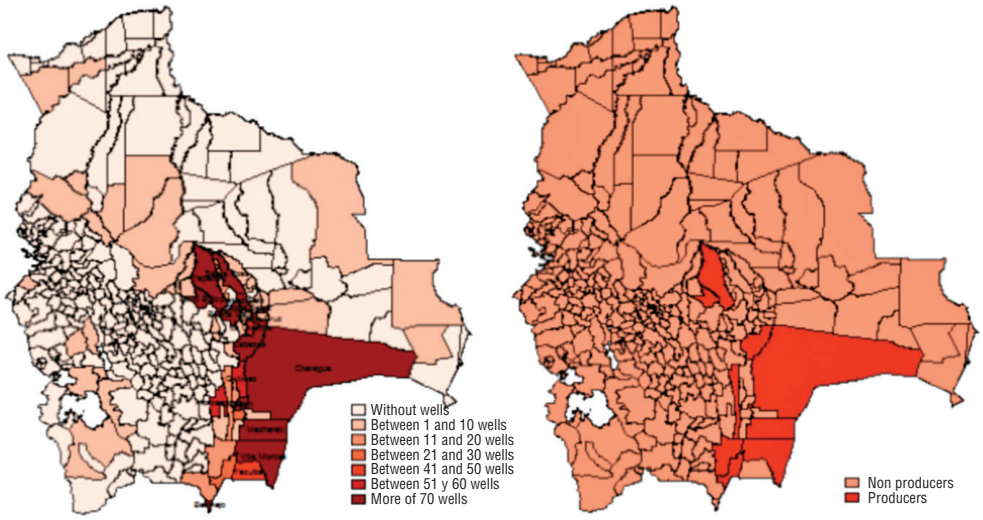
Since it is not possible to distinguish between wells dedicated to exploration or exploitation, two alternative definitions of producing municipalities are used. In the first place, it is assumed that municipalities with more wells have a higher hydrocarbon production. On this assumption, a limit of 30 wells is established to be taken as a producing municipality. Because the distribution shows a gap in that value[6], it is assumed that those municipalities with less than 30 wells began to operate recently or are in the process of exploration. Through this mechanism, it was possible to identify 18 hydrocarbon producing municipalities (Illustration 1, panel A) located in the 4 departments that exported hydrocarbons in the period 2001-2012 (Table 1). Despite this, there is still the risk of including municipalities with low production. For this reason, additionally, a more restrictive definition is considered according to the location of mega fields. The

5 The update used in the present work was made in October 2017. The data is available at https://geo.gob.bo/

6 The histogram of the number of wells per municipality can be seen in the annex

data of YPFB[7] show that 85.8% of gas production subject to IDH payment comes from 9 fields: Sábalo, San Alberto, Tacobo, Vuelta Grande, Bulo, Yapacani, Rio Grande, Itau and Margarita - Huacaya. Then, a municipality is defined as a producer if it contains at least one well that composes these exploitation fields (Illustration 1, panel B).

Illustration 1
Number of wells in exploration and exploitation



A. Location of wells

B. Location of mega fields

Source: Own elaboration with GeoBolivia data.

7 Yacimientos Petrolíferos Fiscales Bolivianos, is the state company with presence in the stages of exploration, exploitation, transportation and distribution of hydrocarbons in Bolivia. Data obtained from the 2012 statistical bulletin http://www.ypfb.gob.bo/es/component/phocad-ownload/category/72-publicaciones.html?download=457:boletin-estadistico-2012

Table 1
Hydrocarbons Exportation per state, 2001 a 2012

Year	Chuquisaca	Cochabamba	Tarija	Santa Cruz	Total
2001	6,08	12,40	44,34	37,18	100
2002	1,86	8,34	58,78	31,02	100
2003	1,14	5,82	73,14	19,90	100
2004	1,11	4,31	78,09	16,48	100
2005	1,45	4,25	79,87	14,44	100
2006	4,24	2,73	77,78	15,25	100
2007	4,97	7,32	72,37	15,33	100
2008	6,13	9,18	68,84	15,84	100
2009	5,57	7,48	70,38	16,57	100
2010	5,50	6,40	68,64	19,46	100
2011	4,23	6,19	67,06	22,52	100
2012	2,71	4,88	70,64	21,77	100

Source: National Institute for Statistics.

On the other hand, the role of the transfers of resources made by the central government to the municipalities between 2005 and 2012[8] is analyzed. Apart from these, there are other income that goes to the municipalities. However, it was not possible to obtain the data by municipality for this source of income, so we focused mainly on this channel. The election of the initial year coincides with the beginning of the super-cycle of exports for Bolivia, in addition to the introduction of the new Hydrocarbons Law. The data show that the value of natural gas exports increased considerably in 2005, the variation in that year compared to the previous one is 75%. Meanwhile, in the period from 2002 to 2004, the inter-annual variation was increasing but lower: 11%, 46% and 59%, respectively (Ilustration 2).

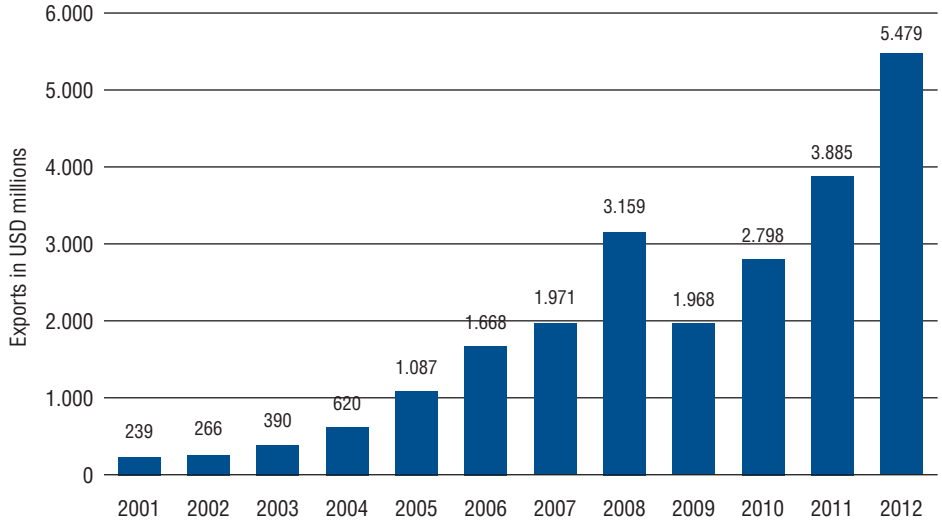
The way to approach a possible curse or blessing of natural resources is through Human Development. From the perspective of Sen (2001), human development is a vision that favors the development of capacities of the people that they value and have reason to value, as a goal in itself. On the other hand, and related to the literature reviewed, human development also has an instrumental utility. A recognized condition for overcoming the curse of natural resources in terms of economic growth, is to convert assets that are under ground, in capital that can be used in other sectors (Venables, 2016). Then, human development takes on a second meaning as it relates to human capital.

In the study we approach human development from health, education and employment. While people have many other characteristics to value in their lives; Health and education are especially important since they allow the development of other types of capabilities (Sen, 2001). For example, education can serve to keep people informed and achieve a better exercise of their rights. Furthermore, the existence of externalities at the local level of the level of education or of immunization campaigns, has been clearly

8 Data obtained from www.udape.gob.bo

evidenced by the impact evaluation literature. On the other hand, being able to get a job is a fundamental condition to obtain the economic means, necessary for the life that a person values.

Illustration 2
Exportation of Bolivian gas



Source: National Institute of Statistics.

4.1. Methodology of comparison between municipalities

The data analyzed in section 5 are intended to give an idea of the effect of transfers from the central government to local governments on the indicators of human development indicated above. In first place, it is analyzed whether being a producer municipality is related to differences in the amount of resources captured by transfers from the central government. This amount adds the transfers received by each municipality between 2005 and 2012 expressed in US dollars per person. The income is taken by total transfers and not only the income by IDH. The reason for this methodological decision is the action of state spending, which is a feature widely found in the literature on the effectiveness of cooperation (Collier & Dollar, 2002) and the complementarity of local public goods (i.e., better neighborhood roads can reduce the time necessary to go to school or to the health center). On the other hand, IDH transfers were on average 33% of the income obtained by the municipalities between 2005 and 2012, which indicates that as of 2005, this was the main source of variation in the distribution of transfers to municipal governments.

As a next step in the sequence, the relationship between being a producer municipality and variables that approximate three dimensions of human development is analyzed. In the case of education, the school attendance of the population of school age (6 to 18 years) and

the amount of population of school age per educational institution[9] in each municipality were taken as variables. In the health dimension, the proportion of people over 18 who visit a health establishment when they need it and the amount of population by health establishment in the municipality were analyzed. In both dimensions, the first variable is close to the use of services and the second to access. Finally, we approach economic capacity through participation in the labor market seen through the gross employment rate[10] of the population between 18 and 65 years. Due to the use of census data, it is not possible to have another variable which helps us to get an approximate income.

Comparisons are made on the means of the groups at three levels: comparison between producing and non-producing municipalities, belonging to the same department, and comparison of producing and non-producing municipalities that are in the same province. This will help us to have an idea of how the producing municipalities are positioned in relation to three different reference groups. It is expected that as the reference becomes more specific, the differences will be reduced (Loayza & Rigolini, 2016). The main reason for this, is the existence of increasingly similar characteristics in relation to unobservable characteristics such as institutions, geographic, environmental and biological elements, social composition, among others (Loayza & Rigolini, 2016, Carreri & Dube, 2014).

For this purpose, the following 3 models are estimated:

Equation 1: Comparison between producing and non-producing municipalities

$$Y_m = \alpha + \beta Prod_m + \delta_1 P_m^{2001} + \delta_2 P_m^{2001} * Prod_m + \mathbf{x'}_m \boldsymbol{\gamma} + \varepsilon_m$$

Equation 2: Comparison between producing and non-producing municipalities of the same department

$$Y_m = \alpha + \beta Prod_m + \delta_1 P_m^{2001} + \delta_2 P_m^{2001} * Prod_m + \mathbf{x'}_m \boldsymbol{\gamma} + \eta_d + \varepsilon_m$$

Equation 3: Comparison between producing and non-producing municipalities of the same province

$$Y_m = \alpha + \beta Prod_m + \delta_1 P_m^{2001} + \delta_2 P_m^{2001} * Prod_m + \mathbf{x'}_m \boldsymbol{\gamma} + \eta_p + \varepsilon_m$$

In the previous equations Y_m refers to the dependent variable: transfers received by the municipality, health variables, education and employment. Meanwhile, $Prod_m$ is a dummy that takes the value of 1 when the municipality is producing gas and 0 in other

9 In the case of health, the total population in 2012 is taken in relation to the number of health facilities in 2012. In the case of education, the population of school age is taken in 2012, 6 to 18 years, by educational establishment in 2013. The data of health and education establishments come from https://geo.gob.bo/.

10 It is defined as the relationship between the Employed Population and Working Age Population.

way. The coefficient related to this variable will be interpreted as the difference in the comparison of the municipalities. Additionally, the population is included in the year 2001 (P_m^{2001}) and a variable of interaction between population and gas producing municipality ($P_m^{2001} * Prod_m$). The initial development situation can influence the channels by which hydrocarbon production is related to development. In that sense, the population can be a proxy of this initial level of development (Smith 2015). The row vector X'_m is a vector of important controls: a dummy is included for municipalities with mining exploitation[11], and another one for large cities (with 500,000 inhabitants or more). Finally, the variables η_d y η_p refer to fixed effects by department and province, respectively, while ε_d Is the error term.

Finding a relationship between producing hydrocarbons and any of the human development variables contemplated could be due to any of the channels mentioned in section 2 of the document. For that reason, a comparison is also made taking into account as return of the transfers per person received by each municipality. For this, the following three models for the variables related to human development will be estimated:

Equation 4: Comparison between producing and non-producing municipalities

$$Y_m = \alpha + \beta_1 Prod_m + \beta_2 Tpc_m + \delta_1 P_m^{2001} + \delta_2 P_m^{2001} * Prod_m + \mathbf{x'}_m\boldsymbol{\gamma} + \varepsilon_m$$

Equation 5: Comparison between producing and non-producing municipalities of the same department

$$Y_m = \alpha + \beta_1 Prod_m + \beta_2 Tpc_m + \delta_1 P_m^{2001} + \delta_2 P_m^{2001} * Prod_m + \mathbf{x'}_m\boldsymbol{\gamma} + \eta_d + \varepsilon_m$$

Equation 6: Comparison between producing and non-producing municipalities of the same province

$$Y_m = \alpha + \beta_1 Prod_m + \beta_2 Tpc_m + \delta_1 P_m^{2001} + \delta_2 P_m^{2001} * Prod_m + \mathbf{x'}_m\boldsymbol{\gamma} + \eta_p + \varepsilon_m$$

In comparison to equations 1, 2 and 3; an additional return is introduced in equations 4, 5 and 6. This variable is the amount of transfers received between 2005 and 2012 by municipalities expressed in US dollars per person. In this way, it is possible to differentiate the effect of one of the channels related to the collection of rents by the municipal governments. It should be noted that not rejecting the hypothesis that transfers do not influence human development is not equivalent to proof that the municipal channel does not work, it only refers to specific vertical transfers.

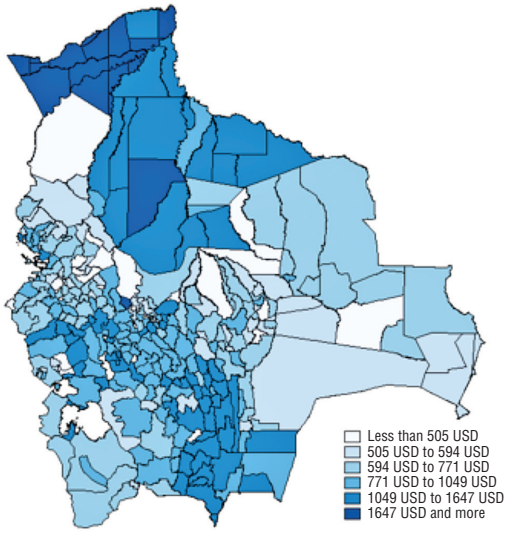
11 The information corresponds to the map of mining activity in 2002, and comes from https://geo.gob.bo/

5. Results

5.1. Transfers

The regressions show that being a producing municipality does not increase the transfers received per person. Under the definition of mega fields (Table 2), producing gas increases transfers when all municipalities are compared. However, when the comparison group is the municipalities of the same department, the result is negative. Although the results are not significant, this is consistent with the distribution mechanism discussed above. The prioritization is done by departments, but once the resources are distributed to this level, the distribution within each department does not favor the producing municipalities. On the other hand, when analyzing the transfer variable under the definition of number of wells (Table 3), the relationship is negative and not significant in two of the three comparison groups. This result may be due to the inclusion of municipalities where medium and small wells operate with low production levels. When municipalities are compared at the provincial level, the fact of producing gas shows a significant reduction in transfers of 95 dollars per person; an average of 12 dollars per year approximately. This situation can be better appreciated in Figure 3. The map shows a distribution of transfers received quite different from the distribution of wells. The most privileged municipalities are in Pando and Beni as well as Tarija and Chuquisaca. In conclusion, at the national level the producing municipalities were in a better position than the non-producers; but when refining the comparison at department and province level this advantage disappears.

Illustration 3
Cumulative municipal transfers received between years 2005-2012, in US dollars per person



Source: Own elaboration based on Geo Bolivia and National Institute of Statistics data.

5.2. Health

The municipalities with gas production show that they relate to a smaller number of people served by health facilities. Under the definition of mega fields (Table 4), at national scale, the producing municipalities have establishments that, on average, serve a significantly smaller number of people than non-producing municipalities. When the comparison is made between municipalities belonging to departments and provinces producing this relationship weakens. However, under the definition of number of wells (Table 5), the producing municipalities are related to a greater number of patients attended, in the three levels of comparison, so the evidence is not strong to the definition change.

On the other hand, when considering the channel of transfers (models 4, 5 and 6), there is a significant and strong relationship between municipalities in the same province. Under the definition of mega fields, for every $ 100 more transfers per person can be reduced by 130 the number of patients served by each establishment compared to municipalities in the same province. Under the definition of number of wells this ratio is 125 less patients. On the other hand, the inclusion of the variable of transfers does not greatly affect the relationship between gas production, population and health facilities; which indicates that the other channels are also important.

When analyzing the second health variable, it was evident that higher gas production is related to greater utilization of health services. Under the definition of mega camps (Table 6), the population of municipalities that produce gas goes to health services 10% more than municipalities that do not attend. When we compare the municipalities of the same department, this effect is reduced by half, a difference of approximately 5%. Finally, at the provincial level there is no significant difference. Under the definition of number of wells (Table 7), the difference at the national level is lower, while at the departmental and provincial levels the production of gas is not related to any difference, so the result is not strong to this definition change. It is important to note that in all cases the advantage of being a gas producing municipality is reducing with the size of the population.

Finally, the relationship between transfers and utilization of services shows to be significantly positive when the comparison group is national; but not so for more specific comparison groups. Under both definitions of a gas-producing municipality, increasing transfers per person by $ 1,000 would increase the utilization of health services by 3% compared to an average municipality that does not experience changes in the transfers received. The effects related to gas production do not vary much when the transfer variable is introduced and remain significant (Table 6), which indicates that the other channels are also relevant in relation to the use of health services.

5.3. Education

In the case of the amount of population of school age per educational establishment, it could be shown that producing gas is related to a smaller number of students per location only when the comparison group is national. Under the criterion of mega fields (Table 8), producing gas is related to 92 fewer children per educational establishment, compared

to a municipality without gas production. However, this positive effect is lower when the municipality is larger. When the comparison is at departmental and provincial levels there is no difference, showing that production benefits not only the producing municipality, but also those which are part of the same department. Under the criterion of number of wells (Table 9), the results are not significant and show the opposite sign.

On the other hand, the transfers channel shows a relation of the producing municipalities with a smaller number of children per educational establishment. Unlike the production effect, this channel operates when the comparison group is from the municipalities of the same department. The inclusion of the variable also does not affect the effect related to gas production to a large extent.

In the case of school attendance, higher production is related to greater use of educational services when the comparison group is within the department. Under the definition of mega camps (Table 10), a producing municipality shows a higher school attendance by 3.5% than other municipalities of the same department that are not producers. However, this effect is reduced according to the size of the municipality. This interactive effect is also present when the comparison group is national; which means that in general, as the population of the producing municipalities grows, school attendance reduces more than in the case of non-producing municipalities. Under the definition of number of wells (Table 11) the direct relationship disappears, while the interactive effect with the population becomes weaker.

On the other hand, receiving larger transfers per person is related to lower school attendance consistently. This effect is significant when the comparison group is at department level and province level, being stronger for the second. When introducing the variable of transfers among the returns of Table 11, the effect of producing gas remains significant; showing the importance of the other channels.

Finally, under none of the established scenarios (Table 12 and Table 13), gas production or the presence of transfers seem to significantly affect the occupancy rate of the municipalities. Only under the definition of the number of wells (Table 13) producing gas improves employment prospects when the municipal population grows.

6. Conclusions

The main findings of this document are that the production of hydrocarbons is related to better access and greater use of health services and better access to educational services. However, these differences weaken as the comparison group becomes more specific, which corresponds to the work of Loayza and Rigolini (2016). The evidence also shows that gas producing municipalities do not benefit from receiving larger transfers than the rest of the municipalities, belonging to their same province, department or country; only under the definition based on the number of wells the municipalities showed lower transfers than their provincial neighbors, although no significant difference was found with the rest of the municipalities.

When the variable of transfers was introduced, it was found that these showed a relationship that was consistent with the effect of production in the case of access

and use of health services. On the other hand, the negative relationship between this variable and school attendance draws attention. The same could be interpreted as a renter signal (see Lasserna, 2009, Evia et al., 2008); but the evidence is insufficient and deserves more attention. On the other hand, this case shows that the aggregate average relationship contains several channels with heterogeneous relationships and that a better understanding of the situation can be achieved by identifying them and differentiating their effects.

Likewise, it is necessary to address in future research the influence of institutional quality, because although the amount of transfers received by municipalities is important for the public investment they make, the impact on human development of this investment will depend on the degree of effectiveness of the public spending, as shown by Caselli and Michaels (2014). The efficient use of natural resources for the development of other capacities is characterized by two challenges: using resources when they are needed instead of when they are obtained; and use them in the most cost-effective options instead of doing so based on the demands of actors with bargaining power (Venables, 2016). Information at the municipal level of both circumstances could help to better understand the link between hydrocarbon production and local development.

Changes in coefficients caused by a change in the definition of producing municipality suggest that the definition based on number of fields is deficient or reflects heterogeneity. The definition may be deficient in the case that larger wells are not related too much with higher production at the municipal level, a result that may be related to the number of abandoned wells or the reduced importance of small wells in terms of production. On the other hand, there may be heterogeneity in the sense that a low gas production would be related to a worse position compared to non-producing municipalities of the same department. Obtaining production data for each of the 2403 wells identified would better establish the characteristics of this heterogeneity.

One of the practical problems that was found was the small amount of data. Many of the differences found showed economic relevance but were not significant. The power of the tests could be improved with the use of maps with a higher level of disaggregation.

The results show no causal evidence between hydrocarbon production and the outcome variables taken into account. Problems that are recognized in the literature are related to: the endogeneity of exploration, meaning that places with better institutions and greater economic development invest more in exploration activities (Smith, 2015). Another problem is that, given the restriction of data, it is not possible to differentiate between traditionally producing areas, from others that began to produce in the period that may differ considerably in the operation of extractive institutions. On the other hand, some techniques such as differences in inequalities or synthetic control are limited by the low frequency of the data.

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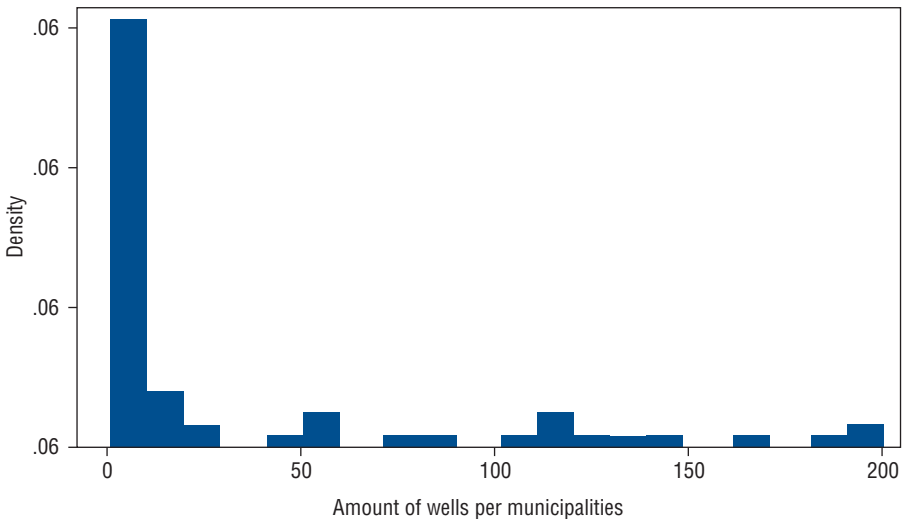
Annex

Illustration 4
Municipal distribution of wells, conditional on having at least one well



Note: Only municipalities with at least one well in exploration or exploitation are taken into account. The width of each bar is 10 wells, the municipalities with more than 200 wells were censored to 200 wells in order to improve the exposure of the idea.

Table 2
Income from transfers per person, municipalities with mega fields

	(1) All the municipalities	(2) Municipalities of the same state	(3) Municipalities of the same province
Gas producer	355.3 (220.0)	-44.81 (202.9)	-35.37 (246.9)
Municipal Population 2001	-0.000921 (0.00114)	-0.000335 (0.000193)	0.00000575 (0.000478)
Interaction between population and gas production	-0.0239*** (0.00703)	-0.00374 (0.00736)	-0.00554 (0.00803)
Mineral producer	-86.64 (121.4)	32.80 (32.47)	72.86 (54.41)
>=500.000 inhabitants in 2001	429.7 (754.1)	201.6 (143.0)	37.81 (419.4)
Observations	339	339	339

Standard errors in parentheses, conglomerate errors are used at the department level.
* p < 0.10, ** p < 0.05, *** p < 0.01

Table 3
Income from transfers per person, municipalities with 30 or more wells

	(1) All the municipalities	(2) Municipalities of the same state	(3) Municipalities of the same province
Gas producer	-167.3 (184.2)	-52.54 (49.47)	-95.46** (39.63)
Municipal Population 2001	-0.00140 (0.00196)	-0.000525 (0.000460)	0.00000588 (0.000808)
Interaction between population and gas production	0.000620 (0.000991)	0.000236 (0.000279)	0.0000848 (0.000276)
Mineral producer	-93.92 (121.6)	35.82 (31.62)	71.26 (53.28)
>=500.000 inhabitants in 2001	658.9 (1118.8)	291.2 (230.4)	28.61 (574.7)
Observations	339	339	339

Standard errors in parentheses, conglomerate errors are used at the department level.
* p < 0.10, ** p < 0.05, *** p < 0.01

Table 4
People for each health center in 2012, municipalities with mega fields

	(1) All municipalities	(2) Municipalities of the same department	(3) Municipalities of the same province	(4) All municipalities	(5) Municipalities of the same department	(6) Municipalities of the same province
Gas producer	-2436.7***	-650.9	-1890.2	-2166.0***	-713.9	-1936.1
	(384.4)	(417.0)	(1487.6)	(337.0)	(674.2)	(1784.2)
Municipal Population 2001	0.0372***	0.0371***	0.0434**	0.0365***	0.0366***	0.0434**
	(0.00698)	(0.00714)	(0.0145)	(0.00702)	(0.00721)	(0.0141)
Interaction between population and gas production	0.0897***	0.000871	0.0859**	0.0715***	-0.00439	0.0788
	(0.0258)	(0.0169)	(0.0371)	(0.0210)	(0.0236)	(0.0446)
Mineral Producers	-354.5	11.20	193.0	-420.5	57.37	287.6
	(264.0)	(449.4)	(443.8)	(269.6)	(431.0)	(455.5)
>=500.000 inhabitants in 2001	-11686.2*	-12135.7*	-21754.9	-11358.8*	-11852.0*	-21705.8
	(5936.8)	(6072.2)	(13267.6)	(6014.9)	(6113.7)	(12943.9)
Municipal transferences per person				-0.762	-1.408	-1.298*
				(0.480)	(0.793)	(0.643)
Observations	339	339	339	339	339	339

Standard errors in parentheses, conglomerate errors are used at the department level.
* p < 0.10, ** p < 0.05, *** p < 0.01

Table 5
People for each health center, municipalities with 30 or more wells

	(1) All municipalities	(2) Municipalities of the same department	(3) Municipalities of the same province	(4) All municipalities	(5) Municipalities of the same department	(6) Municipalities of the same province
Gas producer	536.1*	305.4	1277.1**	412.0	234.2	1157.4**
	(245.3)	(383.3)	(391.1)	(229.1)	(334.9)	(399.6)
Municipal Population 2001	0.0438**	0.0447**	0.0480*	0.0428**	0.0439**	0.0480*
	(0.0140)	(0.0138)	(0.0231)	(0.0137)	(0.0137)	(0.0227)
Interaction between population and gas production	-0.00683	-0.00732	-0.00496	-0.00637	-0.00700	-0.00486
	(0.00858)	(0.00834)	(0.00816)	(0.00824)	(0.00810)	(0.00801)
Mineral Producers	-316.7	-4.625	171.5	-386.4	43.91	260.8
	(290.1)	(416.4)	(429.9)	(279.4)	(400.9)	(452.2)
>=500.000 inhabitants in 2001	-14874.4*	-15855.3*	-23864.3	-14385.7	-15460.7*	-23828.5
	(7808.5)	(7902.5)	(16529.5)	(7800.8)	(7948.8)	(16192.7)
Municipal transferences per person				-0.742	-1.355	-1.254*
				(0.499)	(0.767)	(0.656)
Observations	339	339	339	339	339	339

Standard errors in parentheses, conglomerate errors are used at the department level.
* p < 0.10, ** p < 0.05, *** p < 0.01

Table 6
Percentage of the adult population that goes to a health facility when necessary in 2012, municipalities with mega fields

	(1) All municipalities	(2) Municipalities of the same department	(3) Municipalities of the same province	(4) All municipalities	(5) Municipalities of the same department	(6) Municipalities of the same province
Gas producer	11.37*** (2.899)	5.314** (1.705)	3.232 (1.912)	10.26*** (2.664)	5.263** (1.960)	3.267 (1.893)
Municipal Population 2001	0.0000224 (0.0000156)	-0.00000107 (0.0000108)	-0.00000705 (0.0000262)	0.0000253 (0.0000164)	-0.00000145 (0.0000110)	-0.00000706 (0.0000264)
Interaction between population and gas production	-0.000384*** (0.0000629)	-0.000346*** (0.0000823)	-0.000244*** (0.0000623)	-0.000309*** (0.0000785)	-0.000350*** (0.0000877)	-0.000238*** (0.0000579)
Mineral Producers	-8.464*** (1.551)	-2.007* (1.064)	-2.911 (2.467)	-8.194*** (1.673)	-1.969* (1.005)	-2.983 (2.080)
>=500.000 inhabitants in 2001	-11.21 (10.34)	7.279 (8.092)	18.53 (23.29)	-12.56 (10.50)	7.510 (8.451)	18.49 (23.77)
Municipal transfences per person				0.00312* (0.00163)	-0.00115 (0.00446)	0.000994 (0.00619)
Observations	339	339	339	339	339	339

Standard errors in parentheses, conglomerate errors are used at the department level.
* p < 0.10, ** p < 0.05, *** p < 0.01

Table 7
Percentage of the adult population that goes to a health facility when necessary in 2012, municipalities with 30 or more wells

	(1) All municipalities	(2) Municipalities of the same department	(3) Municipalities of the same province	(4) All municipalities	(5) Municipalities of the same department	(6) Municipalities of the same province
Gas producer	5.409 (3.004)	-0.253 (0.966)	-0.892 (1.371)	5.962* (3.030)	-0.307 (1.012)	-0.789 (1.557)
Municipal Population 2001	0.0000407*** (0.0000115)	0.0000153 (0.00000889)	0.0000261 (0.0000173)	0.0000454*** (0.00000911)	0.0000148 (0.00000946)	0.0000260 (0.0000177)
Interaction between population and gas production	-0.0000241*** (0.00000440)	-0.0000156*** (0.00000352)	-0.0000279*** (0.00000626)	-0.0000261*** (0.00000303)	-0.0000153*** (0.00000365)	-0.0000280*** (0.00000658)
Mineral Producers	-8.319*** (1.468)	-2.142* (1.064)	-3.244 (2.497)	-8.009*** (1.588)	-2.105* (1.009)	-3.321 (2.108)
>=500.000 inhabitants in 2001	-19.55* (9.660)	-0.620 (6.287)	2.735 (12.37)	-21.72** (8.729)	-0.319 (6.707)	2.705 (12.76)
Municipal transfences per person				0.00330* (0.00151)	-0.00103 (0.00445)	0.00108 (0.00627)
Observations	339	339	339	339	339	339

Standard errors in parentheses, conglomerate errors are used at the department level.
* p < 0.10, ** p < 0.05, *** p < 0.01

Table 8
School population served by educational establishment in 2012, municipalities with mega fields

	(1) All municipalities	(2) Municipalities of the same department	(3) Municipalities of the same province	(4) All municipalities	(5) Municipalities of the same department	(6) Municipalities of the same province
Gas producer	-92.16*** (22.89)	-35.61 (34.37)	-76.03 (112.9)	-77.20** (29.04)	-40.95 (52.59)	-79.43 (135.7)
Municipal Population 2001	0.00105*** (0.000263)	0.00102*** (0.000304)	0.000906 (0.000533)	0.00101*** (0.000254)	0.000986** (0.000298)	0.000906 (0.000501)
Interaction between population and gas production	0.00382*** (0.00100)	0.000991 (0.00171)	0.00395 (0.00399)	0.00281* (0.00143)	0.000581 (0.00215)	0.00342 (0.00473)
Mineral Producers	-45.75** (15.92)	-29.31 (26.95)	-29.34 (32.29)	-49.54** (16.13)	-26.19 (24.83)	-22.33 (32.20)
>=500.000 inhabitants in 2001	-402.6** (144.1)	-394.0* (178.5)	-447.0 (576.6)	-383.8** (136.6)	-370.2* (170.8)	-443.4 (543.0)
Municipal transfences per person				-0.0425 (0.0239)	-0.112* (0.0579)	-0.0962 (0.0531)
Observations	338	338	338	338	338	338

Standard errors in parentheses, conglomerate errors are used at the department level.
* p < 0.10, ** p < 0.05, *** p < 0.01

Table 9
School population served by educational establishment in 2012, municipalities with 30 or more wells

	(1) All municipalities	(2) Municipalities of the same department	(3) Municipalities of the same province	(4) All municipalities	(5) Municipalities of the same department	(6) Municipalities of the same province
Gas producer	22.50 (16.16)	15.48 (28.53)	51.63* (24.70)	15.60 (19.64)	9.641 (24.28)	42.60 (22.92)
Municipal Population 2001	0.00189*** (0.000404)	0.00191*** (0.000420)	0.00171** (0.000575)	0.00183*** (0.000356)	0.00185*** (0.000379)	0.00171** (0.000527)
Interaction between population and gas production	-0.000819** (0.000262)	-0.000843** (0.000260)	-0.000726*** (0.000194)	-0.000794*** (0.000234)	-0.000817*** (0.000234)	-0.000718*** (0.000180)
Mineral Producers	-49.38** (15.56)	-35.07 (24.70)	-36.07 (28.24)	-53.30*** (14.95)	-31.73 (22.88)	-29.33 (28.34)
>=500.000 inhabitants in 2001	-810.4*** (196.4)	-827.0*** (202.6)	-828.3* (418.2)	-783.0*** (176.3)	-794.1*** (186.5)	-825.6* (384.4)
Municipal transfences per person				-0.0405 (0.0243)	-0.108* (0.0555)	-0.0947 (0.0527)
Observations	338	338	338	338	338	338

Standard errors in parentheses, conglomerate errors are used at the department level.
* p < 0.10, ** p < 0.05, *** p < 0.01

Table 10
Percentage of school-age population that attended school in 2012, municipalities with mega-camps

	(1) All municipalities	(2) Municipalities of the same department	(3) Municipalities of the same province	(4) All municipalities	(5) Municipalities of the same department	(6) Municipalities of the same province
Gas producer	-1.809 (1.682)	3.523* (1.659)	-2.672 (3.726)	-0.934 (1.390)	3.402* (1.776)	-2.781 (3.550)
Municipal Population 2001	0.00000935 (0.00000759)	0.0000141 (0.00000930)	0.0000120 (0.00000970)	0.00000708 (0.00000666)	0.0000132 (0.00000913)	0.0000120 (0.00000919)
Interaction between population and gas production	-0.0000725** (0.0000233)	-0.000264*** (0.0000342)	-0.0000758 (0.0000539)	-0.000131*** (0.0000181)	-0.000274*** (0.0000529)	-0.0000928 (0.0000636)
Mineral Producers	0.995 (0.748)	-0.562 (0.900)	-0.143 (0.974)	0.782 (0.671)	-0.473 (0.872)	0.0810 (0.978)
>=500.000 inhabitants in 2001	-2.349 (4.704)	-6.422 (6.071)	-7.514 (8.847)	-1.292 (4.222)	-5.877 (5.897)	-7.398 (8.026)
Municipal transfences per person				-0.00246*** (0.000684)	-0.00270* (0.00132)	-0.00307 (0.00351)
Observations	339	339	339	339	339	339

Standard errors in parentheses, conglomerate errors are used at the department level.
* p < 0.10, ** p < 0.05, *** p < 0.01

Table 11
Percentage of school-age population that attended school in 2012, municipalities with 30 or more wells

	(1) All municipalities	(2) Municipalities of the same department	(3) Municipalities of the same province	(4) All municipalities	(5) Municipalities of the same department	(6) Municipalities of the same province
Gas producer	-0.309 (1.057)	0.909 (1.545)	-0.258 (1.817)	-0.713 (1.026)	0.774 (1.465)	-0.532 (1.744)
Municipal Population 2001	0.0000212** (0.00000803)	0.0000291*** (0.00000671)	0.0000249*** (0.00000661)	0.0000178** (0.00000598)	0.0000278*** (0.00000627)	0.0000249*** (0.00000640)
Interaction between population and gas production	-0.0000112** (0.00000470)	-0.0000151** (0.00000475)	-0.0000108*** (0.00000308)	-0.0000096** (0.00000358)	-0.0000145*** (0.00000420)	-0.0000105*** (0.00000307)
Mineral Producers	1.037 (0.770)	-0.585 (0.879)	-0.270 (0.959)	0.810 (0.689)	-0.493 (0.857)	-0.0653 (0.969)
>=500.000 inhabitants in 2001	-8.076* (3.828)	-13.64** (4.136)	-13.70** (4.790)	-6.487* (2.865)	-12.89** (4.141)	-13.61** (4.624)
Municipal transfences per person				-0.00241** (0.000720)	-0.00256* (0.00130)	-0.00287 (0.00349)
Observations	339	339	339	339	339	339

Standard errors in parentheses, conglomerate errors are used at the department level.
* p < 0.10, ** p < 0.05, *** p < 0.01

Table 12
Gross occupation rate 2012, municipalities with mega camps

	(1) All municipalities	(2) Municipalities of the same department	(3) Municipalities of the same province	(4) All municipalities	(5) Municipalities of the same department	(6) Municipalities of the same province
Gas producer	-1.294 (4.544)	0.749 (2.493)	2.026 (6.370)	-0.647 (4.316)	0.829 (2.732)	2.031 (6.422)
Municipal Population 2001	-0.0000194 (0.0000135)	-0.0000116 (0.0000123)	-0.0000186 (0.0000256)	-0.0000210 (0.0000140)	-0.0000110 (0.0000123)	-0.0000186 (0.0000257)
Interaction between population and gas production	0.0000352 (0.000192)	-0.0000411 (0.000141)	-0.00000245 (0.000296)	-0.00000827 (0.000183)	-0.0000345 (0.000147)	-0.00000172 (0.000297)
Mineral Producers	3.276** (1.036)	1.009 (0.965)	0.496 (0.308)	3.118** (1.015)	0.951 (0.951)	0.486 (0.401)
>=500.000 inhabitants in 2001	9.867 (9.227)	2.311 (7.662)	8.537 (22.48)	10.65 (9.321)	1.952 (7.682)	8.532 (22.60)
Municipal transfences per person				-0.00182 (0.00119)	0.00178 (0.00171)	0.000133 (0.00390)
Observations	339	339	339	339	339	339

Standard errors in parentheses, conglomerate errors are used at the department level.
* p < 0.10, ** p < 0.05, *** p < 0.01

Table 13
2012 gross occupation rate, municipalities with 30 or more wells

	(1) All municipalities	(2) Municipalities of the same department	(3) Municipalities of the same province	(4) All municipalities	(5) Municipalities of the same department	(6) Municipalities of the same province
Gas producer	-2.879 (2.084)	-2.292 (1.489)	-0.416 (1.259)	-3.203 (2.207)	-2.206 (1.536)	-0.413 (1.274)
Municipal Population 2001	-0.0000431*** (0.0000103)	-0.0000377*** (0.00000675)	-0.0000521** (0.0000183)	-0.0000458*** (0.00000918)	-0.0000369*** (0.00000672)	-0.0000521** (0.0000184)
Interaction between population and gas production	0.0000260*** (0.00000349)	0.0000266*** (0.00000378)	0.0000290*** (0.00000673)	0.0000272*** (0.00000294)	0.0000262*** (0.00000364)	0.0000289*** (0.00000696)
Mineral Producers	3.229** (1.002)	1.077 (1.024)	0.808*** (0.233)	3.047** (0.966)	1.018 (1.017)	0.806* (0.405)
>=500.000 inhabitants in 2001	21.15** (9.096)	15.07*** (4.131)	24.57* (12.94)	22.43** (8.717)	14.59*** (4.168)	24.57* (13.04)
Municipal transfences per person				-0.00194 (0.00109)	0.00165 (0.00167)	0.0000277 (0.00402)
Observations	339	339	339	339	339	339

Standard errors in parentheses, conglomerate errors are used at the department level.
* p < 0.10, ** p < 0.05, *** p < 0.01

Public policies to attract capital to the mining sector. The case of Works for Taxes

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Abstract

Since the end of the nineties, in several Latin American countries, a process known as mining boom occurred which meant a 500% increase in the budgets of exploration investment between 2003 and 2010. Among the factors that generated the favorable conditions for mining growth, public policies that gave greater general legal certainty to investments and those that granted specific incentives stand out. Within the latter, in this article, we seek to analyze specifically the new incentive policies that are oriented to the development of infrastructure from the Tax Works Act, sanctioned in Peru. We ask ourselves what is the specific role of this law in the attraction of capital to the mining sector and what are the main foundations for the implementation of that public policy. For this work we will rely on interviews carried out, in the analysis of Law 29230 of 2008 and in the regulatory decree published in 2012, and in the ProInversión documents referred exclusively to this law.

Keywords: Public Policies - Mining Sector - Peru - Legislation - works for taxes.

1. Introduction

Mining in Latin America, and especially metal mining, had a significant growth since the nineties. But the growth did not stop there. The budgets for investment in exploration in the region increased by 500% between 2003 and 2010 (ECLAC and UNASUR, 2013-26). And within the countries of the region, Peru was one of the fastest growing countries in the mining sector.

1 This article is the first result of the investigation made by the autor, thanks to a post graduate scholarshop provided by the Postgraduate Program TrAndeS.

There were several factors that contributed to the generation of favorable conditions for a greater attraction of capital to the mining sector throughout the region in the 1990s. Among these factors, the incorporation of new technologies to the prospection process of exploration and exploitation and the reduction of costs, the implementation of a legal framework that grants greater legal security for mining companies, the growth of demand for metals of the Asian countries and the rise in the price of metals in the international market. All these elements generated the favorable environment for Latin America to take place at the end of the nineties, the process known as "mining boom". In Peru, in particular, investment stocks grew 10 times between 1993 and 2012.

Along with the boom in the mining sector, questions were raised, from those that put the environmental and social impacts of mining activity at the center of the issue, to those that focused on the problem of the distribution of benefits generated by mining activity. These questions were creating a climate of greater conflict around the industry, growing to such an extent that in 2013 there were 105 cases, according to the Ombudsman of Peru (OCMAL, 2013, Ombudsman of Peru, 2013). As the conflict arose in the territories where the companies sought to settle, their image deteriorated. As a result of these questions and the extraordinary profits left by the activity for large transnational mining companies, largely due to the rise in international prices of metals above the "normal" values of the market, it is that in those years place in the Peruvian public agenda the debate about what measures should be adopted against these gains. It is in this conflictive context that the Law of works for taxes arose, sanctioned during the government of Alan García.

The hypothesis of this work is that the works law is within the framework of public policies to attract investments "via incentives" of the Peruvian State. It is a position taken (or response) by the State on four issues: 1) the public debate on whether the collection of royalties should be based on the international price of minerals, which generated clear opposition from mining companies; 2) the discontent existing in several communities and the growing social conflict; 3) the consequent need to improve the image of mining companies; and 4) the need to generate better general conditions for production.

This work aims to analyze the Works for Taxes Act (No. 29230) enacted in 2008. The questions that run through the article refer to the genesis of this policy, the main foundations for the implementation of that public policy and its specific role in the generation of favorable conditions for the mining sector. To do this, we will analyze the text of the law, the ProInversión documents and the interviews with officials of said State agency and specialists in the subject. After this introduction, the body of the article is divided into four sections and the conclusions of the work. In the first, we will develop the conceptual framework from which we started to analyze the Tax Works Act as part of the public policies to attract capital from the Peruvian State. In the second section, we will make a brief description of the context in which Law 29230 emerges. Regarding the period analyzed, although at times we refer to more recent events, we focus on the stage of the mining boom - that is, only until 2012 - and, especially, in the years immediately preceding this law. In the third section, we will analyze the most important points of the law. In the fourth section, we will explain its function as a policy of attracting capital to the mining sector. And, finally, we will present the conclusions of the article.

2. Capital Attraction Policies

In this section we intend to give an account of some concepts from which we started when understanding the case of the policy of attracting capital that we analyze in this article.

We start from understanding, as do Hirsch (1999), Altvater (1999) and Jessop (1999), that there is an intensification of the struggle between the "national competition States" for the attraction of global capital flows. From this last perspective, the policies of promotion of foreign direct investments are directly related to that competition between the States in order to attract a part of global capital. But this process is not unidirectional. While the flows of this global capital establish the advantages that guide the dynamics of reorganization and relocation of production, each national State tries to show its territory as more attractive than the rest in view of its establishment, through the generation of the so-called favorable conditions (Bonnet, 2001). However, since the relationship between the national State and the reproduction of global capital is a complex relationship, it cannot be assumed that all policies implemented by the State are necessarily functional to the interests of capital. We take, then, the definition of Oszlak and O'Donnell, according to which a public (or governmental) policy is a position taken by the State that tries - or, more precisely, claims to try - some form of resolution of the socially problematized issue (that is, issues that attract attention, interest or mobilization of certain social groups), whose life cycle begins when they are considered a problem and ends when they cease to be, or are recycled[2]. These authors understand that in the different societies there are innumerable problems, but not all of them become a "public issue", much less a "governmental issue". Only some of these issues are "socially problematized" and manage to be incorporated into the agendas of "socially effective problems". The positions on these issues, "usually include decisions of one or more governmental organizations, simultaneous or successive over time, which constitute the mode of intervention of the State in the matter. Hence, the taking of position does not have to be univocal, homogeneous or permanent "(Oszlak and O'Donnell- 1981: 112).

Within the lines of analysis that focus on the problems on which governments make decisions, some works have emphasized the definition of problems and decision processes; that is, how public problems are defined and decided (Losada, 2003). Among these approaches are those studies on the public agenda, which analyze how and why some issues are included in it and others are not. In order to analyze the process of a public policy, authors such as Oszlak and O'Donnell (1981) start from a research method that includes certain questions: who and how do they problematize an issue? How does that matter become a question? What is the initial definition of a question? And in some of these questions we focus when analyzing the case of Law No. 29230. Public policies are responses that States give to a question through the method of trial and error, since this is the mode of State intervention appropriate to the State in capitalism (O'Donnell, 1978). Then, the implementation of policies to attract capital should be

2 There are a lot of research regarding these process of public policies implementation such as the classic research of Lasswell (1996) and Lindblom (1992) and more recently of Aguilar Villanueva (1992 y 1993) Meny and Thoening (1992), Subirats (2008).

understood, in this sense, as a test and error company. Here, then, we assume foreign investments as a specific expression of those global capital flows and State policies to attract such investments as an equally specific case of this test and error company (Alvarez Huwiler, 2014).

Likewise, the analysis of this relationship between the political and the economic materialized in the State can be made from the functions that the State performs, being these historical, and in that sense variables. According to Altvater (1977), the first of the functions that the States have refers to the creation of the material conditions of production; the second, to the determination and guarantee of the legal system; the third, to the regulation of conflicts; the fourth and last, to the guarantee and expansion of national capital in the world capitalist market. We add to these functions that the author defines, that by which the States generate policies in order to attract capital to their territories, this function being considered as the opposite complement to the fourth function named by the author, when the is a guarantee and expansion of local capital in the world market. For the case we are dealing with here, the first, the second and the last function are the ones that concern us the most and, therefore, the ones that we will explain next.

The first function of the State that defines Altvater as the creation of the material conditions of production depends on the historical moment of the development of capital. Taking the case of the railroad, for example, the author explains that there were periods when it was operated privately because it constituted a direct lucrative form of capital investment, that is, it was profitable. However, at other times, the railroad became a burdensome business for capital, thus passing into the sphere of State activities. Then, when a production process ceases to be profitable for at least one company, it will be abandoned or interrupted, unless it is undertaken or regulated by the State. This happens in general, when the activity in question is important for the social work process.

The example of the railroad can also be observed in the mining activity. As is known, this activity needs to move its production to the ports in order to carry out the export. Because of this, everything that refers to the transport of production is fundamental for the realization of this economic activity. Thus, both means of transport and road networks become a key factor for production and, therefore, a requirement for effective implementation, especially for the case of this activity that is primarily oriented to export. However, transport itself is not a profitable activity for the capital unit, but on the contrary, it means an onerous activity. For this reason, historically, in most cases, the State has been the one in charge of carrying out, managing, concessioning and even financing what is necessary to transport the products of this activity. This is a key point to understand works for taxes, and therefore, we will resume when we see this specific case.

The second function mentioned by Altvater (1977) refers to the determination and guarantee of the general legal system. For its existence, society in capitalism needs the law. But "The law does not 'announce' itself as if it were a force in its own right nor does it 'impose' itself. The Law needs its creator to give it material strength "(Bonefeld, 2005 - 54). Thus, through the law, the State creates, on the one hand, the general requirements for free competition, so that capital is able to continuously carry out the capitalist process of appropriation and, on the other hand, it also codifies the general conditions of work

and production. But it is the State and not the capital units, which can do this task, not being directly subject to the creation of value. It is the State, then, that is qualified to create and monitor compliance with laws, contracts, and so on.

The third function alludes both to pacification responses, clarifying that it is the State that must deal with this task since when capital is affected or threatened as a whole, the capital units can not individually undertake these actions. We understand that this function is a determining characteristic of the modern State, understood as who, in the words of Weber (1967), is awarded the monopoly of legitimate physical violence.

Regarding the last function, which we add to those pointed out by Altvater, it is based on the fact that all States have to try to attract capital to its territory and immobilize it, a process that takes place in a more accelerated way in the stage of globalization. This is so, because the existence of every State depends as much on the reproduction of world capitalism as on the reproduction of capitalism within its own borders. Therefore, the State competes with others by showing what is commonly called "competitive advantages". This explains why certain policies adopted by a given State can be observed in a similar way in other States. In effect, when States take certain policies to attract capital, it is very likely that the same policies will be implemented in several countries. A clear example of this has been the Bilateral Investment Treaties signed by several countries in Latin America and the world, which have in general even a similar articulated structure. In this sense we speak of competition between States, as a logic that goes beyond the characteristics of each particular State.

Some authors identify this competition between States, as a characteristic of the State in the stage of globalization or post-Fordism. Thus, Hirsch (1992, 1996), explains that globalization has led to the transformation of the "State of security" characteristic of Fordism, to a State that calls "State of Competition", whose main characteristic by which it bears his name, is born of the constant bid to attract portions of this global capital, whose movement is accelerating more and more nowadays. And in this sense, it analyzes globalization as an exit from capitalism in the face of the crisis of Fordism, as a bid between the different fractions of capital and as a weakening of the State to the dictates of global capital.

In this context, according to Gligo (2007 - 9), governments can choose between two policy options to attract FDI. The first would be included in what he calls "passive policies," and the second, within what he calls "active policies." Within the passive policies, Gligo (2007) lists the following: 1) FDI regulations, which range from formalities and administrative processes, to legal mechanisms to protect investments at a general level; 2) country conditions, including all factors ranging from human resources to infrastructure, foreign trade and macroeconomics; 3) the country's offer of its conditions and its regulatory framework, compared to other countries.

In the case of "active policies", States adopt more proactive policies to attract certain investments. The most commonly used elements of these policies are: 1) the creation of a specialized organization or agency, generally called "Investment Promotion Agencies", whose main functions are "to promote the attributes of the country among potential investors and to provide support with information and other services, in their evaluation processes "; 2) the creation and offering of incentive mechanisms, which are usually of a

fiscal or financial nature; 3) the improvement of regulatory frameworks (restrictions and barriers) that facilitate investments; 4) the improvement of the investment climate, as in the work force - for example in mining, in many provinces there has been greater support for careers related to the sector, such as geology (Gligo, 2007[3]).

Given this division, we will call "policy of attraction of investments" to all those active policies, in general specific to a sector, which a State implements in a determined territory, beyond the general policies that favor the attraction of all foreign investment. Let's clarify that, although investment promotion policies influence the decisions of international companies when investing in a country, the general policies, we call "passive" will be decisive. If a country does not have a certain "stable" functioning of its economy (for example, if it constantly goes into default) so that investors can project the reproduction of their own capital in the future, it is clear that they will not decide to invest in that country in crisis, even if they are offered some incentive since an investor pursues its future profitability with the lowest possible risk. In this sense, referring to the mining sector, according to the director of the Division of Natural Resources and Infrastructure of ECLAC, "the possession of natural advantages was not enough; the political and economic conditions that would protect investment were also important; territorial competitiveness in terms of the availability of the required infrastructure; the exploitation costs and the potential for new exploration; and the international connectivity of national spaces "(Sánchez Albavera and Lardé, 2006 - 14).

The companies argue that, when investing in a country, there are the so-called investment risks such as: realization risk, exploitation risk, financial risk, market risk, legal risk and political risk[4]. And beyond the use of them to lobby, these risks really exist because capital is an unstable social relationship. And as it is, it requires securities that guarantee its profitability and reproduction, with as few obstacles as possible.

According to Oman (1999) we can distinguish between two types of competences that influence the decision of a transnational company when investing in a country. On one hand, there is the "competition via rules", and on the other hand, the competition "via incentives":

i. Through regulations 'Rule-based': this type of competition can be based on two very different types of measures: a) the reduction of environmental or labor standards (or in the enforcement of these standards); b) the consolidation of economic and political stability, the signing of regional integration treaties, the guarantee of intellectual property rights, the strengthening of the judicial system, the privatization of public companies, the deregulation of markets, the liberalization of flows of commerce and capital, etcetera.

3 In the Peruvian case, this agency received the name of ProInversión.

4 In a survey published by Panorama Minero magazine (N°161) in 1991, one of the arguments most mentioned by companies, when demanding special advantages for the sector, has been the amount of risks that could arise from the financing of a mining project, according to the representatives of the capital market. Among the most indicated are: 1) the risk of realization; 2) the risk of exploitation; 3) financial risk; 4) market risk; 5) legal risk; 6) political risk.

ii. Through 'incentives-based": this route essentially includes: a) financial incentives (direct aids, subsidized loans, guaranteed loans, etc.); b) tax incentives (exemptions and tax rebates, special deductions, exemption from import duties, etc.); c) indirect incentives (provision of land and special infrastructure, preferential access to government purchases, guarantee of monopolistic positions, special regulatory treatments, etc.). Likewise, the creation in a large number of countries of investment promotion agencies, which often offer attractive "packages" of incentives, is also part of this type of competition ".

What distinguishes, then, the incentives of the rules is that they include specific measures that tend to reduce operating or investment costs or to guarantee a certain level of demand or profitability for companies (Chudnovsky and López, 2001). In the nineties and in the following years, both competition-based policies were used via rules and competition through incentives. On one hand, competition "via rules" in terms of economic stability, the liberalization of capital flows, the reduction of environmental standards (as we will see in the specific to mining) and labor (labor flexibility), between others. On the other hand, competition "via incentives", both financial, fiscal, and indirect, had particular importance in the mining sector. This last "competition" is due to the active promotion policies referred to by Gligo (2007). And among these specific promotion policies in the mining sector, we include the public policy implemented in Peru for works for taxes.

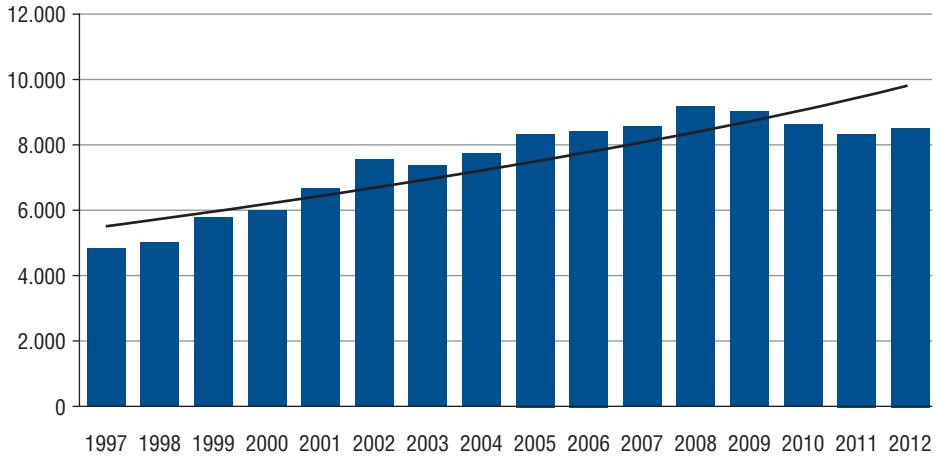
3. Mining boom and general growth factors

Before referring to the law of works for tax, we must place it in the context of growth of the Peruvian mining sector, mentioning the factors that intervened in the regional mining growth and in the specific ones of this country.

The importance of mining in the accumulation mode was not something completely new for the Peruvian case. State-owned companies had played a predominant role in the mining sector of this country, although in the 1980s they had already begun to reduce their investments compared to the previous decades. Within the framework of a wave of privatizations throughout Latin America, between 1993 and 1994, the Peruvian State sold the most important State companies such as Cerro Verde and Tintaya (Campodónico, 1999). This process of privatization of State companies occurred in parallel with the growth of the investments of the largest multinational mining companies in the world directed to this country. The entry of FDI into the mining sector in the 1990s boosted activity, with the first case being that of the Yanacocha company, whose investments caused a huge jump in mining statistics. Between 1993 and 1997, its single existence represented a 21% increase in this activity (Santillana Santos, 2006). After the entry of Yanacocha, other mining projects arrived in Peru, which in the next decade would convert it into the main gold producer in Latin America and the third largest producer of copper, silver, tin and zinc (ProInversión, 2014). This growth was significant even with respect to the Peruvian economy in general. To give an example, between 1990 and 2005, GDP grew by 80%, while mining GDP grew by 221% (Torres, 2007). The Peruvian mining

scene leaped from the late nineties and especially from 2003 with the end of the global recession. Thus, according to the data provided by the Central Reserve Bank of Peru (BCRP), the production of minerals (excluding oil), as can be seen in graph 1, almost doubled in a decade.

Graph 1
Mining Production in Peru (Millions of new Soles at 1994 prices)

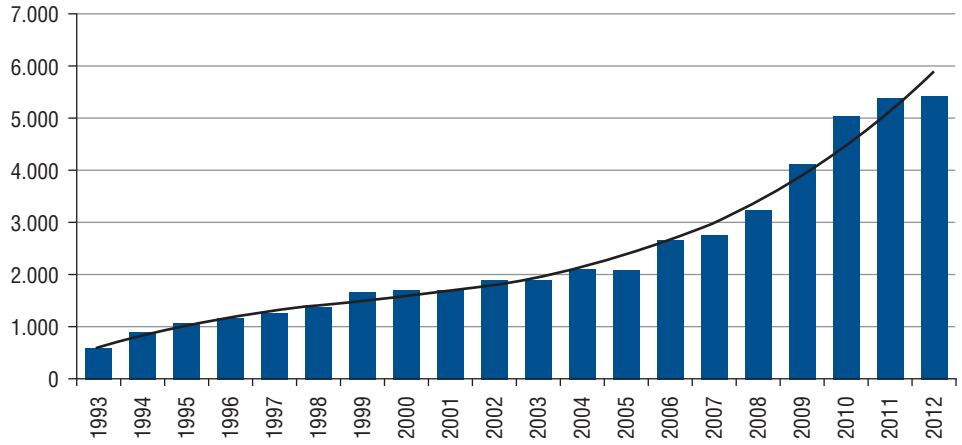


Source: Own elaboration based on data from the Central Reserve Bank of Peru (BCRP).

In this process of growth of Peruvian mining, the number of large-scale mining projects increased, but concentrated in a few mining companies (Minera Yanacocha, Minera Antamina SA, BHP Billiton Tintaya SA, Minera Barrik, Minera Cerro Verde, among others) (De Echave, 2009). To give two examples of this phenomenon, between 2004 and 2005, the mining company Yanacocha concentrated 73% of the gold production, and in 2007, the group of large-scale mining companies, already concentrated approximately 87% of the production of minerals (Torres, 2007). Thus, during the two decades of boom, as the production of metalliferous minerals grew, so did the concentration of this production.

This process of mining boom during the mining boom is also seen in the heading of Foreign Direct Investments (FDI), with a continuous increase between the beginning of the nineties and the current decade. Thus, while in 1993 there were 565 million dollars in the stock of FDI in Peru, the figure reached 5,417 million dollars in 2012, that is, it rose around 10 times in less than two decades (Graph 2). Even in that year the capital flows that entered the Peruvian mining sector grew in such a way that the investments destined to this activity represented 24% of the total investments and with it the item to which more capitals went, surpassing that of industry and even finance. And, according to Pro Investment (2013), of the twelve main investors that made capital movements (either through contributions or acquisition of shares) between 2009-2013, seven belong to the mining sector.

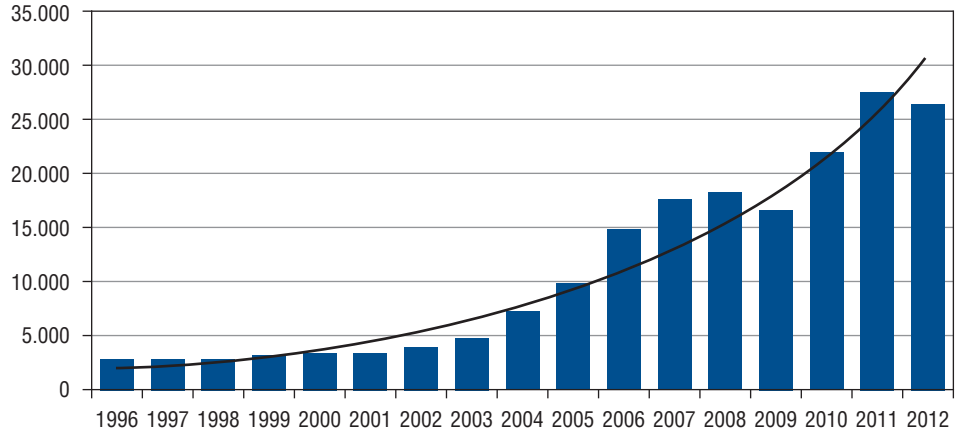
Graph 2
Stock of FDI in the Peruvian mining sector (millions of Dollars)[5]



Source: Own elaboration based on ProInvestment and Conite data.

Mining exports in Peru already occupied an important place in the mid-nineties, although they remained relatively constant until 2002 (see graph 03). But it is in the middle of the following decade that the great jump also occurs in exports, going from 2,731 million dollars in 1997 to 27,361 in 2011, representing almost 60% of the country's total exports in this last year and a 56.44% in 2014 (BCR of Peru 2014).

Graph 3
Peruvian mining exports (millions of FOB dollars)



Source: Own elaboration based on the BCR of Peru.

5 In this table we wanted to reflect the cycle of the mining boom that arrives until 2012, because it is the period that we specifically deal with in this work.

Currently, although the prices of metals have fallen and with them a part of foreign investments, production has remained high. And indeed, in 2016, according to the website of the Ministry of Energy and Mines of Peru, the total estimated production and prospecting units totaled 936.

As for the factors that contributed to the production of favorable conditions for the mining boom, in general, these transcend the Peruvian border. Therefore, we will mention the regional factors in some cases and in others, we will present the specific characteristics of some of these factors in Peru.

In the first place, this regional mining growth is closely linked to the changes that the new mining production process has undergone, completely different from its artisanal version and even that mining undermining, which historically had an undoubted weight in several economies of the region. In the transformation of mining, the development of new technologies was crucial for the extraction of minerals in previously unimaginable territories, where the minerals were scattered. But, in addition, although the new and diverse technologies have been extremely expensive, they meant a significant reduction in the overall costs in all stages of a project, from exploration to exploitation.[6]

Secondly, a fundamental factor that stands out is the rise in the price of metals in the international market and the growth of demand in Asian countries. Although there were moments of stagnation, such as the one that happened after the Asian crisis in the late 1990s or the international financial crisis of 2008-2009, the prices of metalliferous minerals grew since the mid-1990s, but above all they did since the beginning of the 21st century. Thus, between 2001 and 2006, the price of copper grew by 329%, followed by zinc (310%), silver (161%), lead (144%), gold (123%), tin (108%), %), and iron (97%) (Dammert Lira and Molinelli Aristondo, 2007). From 2002 to 2010, metal prices, in general, quintupled their value. Although the price of metals is not always determined by supply and demand, the explanation for this continuous rise is usually found in the new industrialization of Asia and the consequent increase in international demand for metals

In third place, another fundamental factor for attracting capital to the mining sector was the establishment of legal and political conditions that would eliminate obstacles to the entry of capital for exploration and mining exploitation in order to put into operation "new deposits; expand and modernize existing mines and diversify markets "(Sánchez Albavera, 2004 - 93). Peru was one of the pioneer countries in the implementation of policies that established greater legal and political security for the attraction of capital to mining. But the legal reforms that those policies implied, were not exclusive of a local innovation (although they had their imprint at the national level), but they occurred in a context of reforms in several countries of Latin America and the Caribbean. In addition to Peru, these measures were also carried out by Chile, Argentina, Bolivia, Ecuador, Guatemala, Honduras and Mexico[7]. These countries not

6 For more information on the new technologies incorporated in each stage of the production process, see Sanchez Albavera and Lardé (2006), Galafassi (2008).

7 These particular policies of the mining sector, added to the elimination of exchange controls, foreign trade and remittances of profits, general measures that accompanied the mode of accumulation in the 1990s in the region (Piva, 2013).

only shared the historical moment of promulgation of the reforms, but also certain characteristics of the same as: the tendency to reduce the presence of the State in the direct exploitation of minerals, the tax exemption, clauses of non-discrimination to the foreign investment, etc. (Chaparro, 2002).

During the government of Fujimori in Peru, in 1991, the Law of Promotion of Investments in the Mining Sector was approved and, in 1992, the ordered text of the General Mining Law was published. This law established a set of guarantees for companies in the sector, including: a) exchange and administrative stability; b) free disposal of the foreign currency generated by its exports, in the country or abroad and freedom to remit profits, dividends and financial resources; c) free marketing of mineral products; d) deduction of internal taxes that affect its production (buildings necessary for the mining activity); e) refund of the general sales tax, (which is 18%) for purchases of goods and services made by the companies, by offsetting the amount paid with the one applicable to their taxed operations and also against the tax on the rent under his charge (Alvarez Huwiler, Godfrid and Duarez, 2016). These measures implied the free commercialization, stability and tax reductions to companies in the sector, such as the deduction of expenses in exploration of the income tax. For the Peruvian case, in addition, that reform meant that the investments made by the companies in "infrastructure that constitute a public service" would also be deductible from the income tax (Torres, 2007). So, although the mining boom can be explained by multiple factors, all the reforms in the legal framework, meant one of the main incentives for mining companies.

In the decade that followed, that legal framework of the 1990s, which favored the attraction of capital and the development of large-scale mining, did not undergo substantial transformations that damaged companies[8]. However, in several countries of the region, socio-environmental conflicts were translated into judicial measures that suspended some mining projects as well as blocking actions by the communities. Peru was not exempt from this and this provoked a claim from the companies due to the climate of greater uncertainty that contradicted the climate of legal and political stability that had paved the way in the period of the mining boom since the late 1990s.

4. Genesis and functions of works for taxes

From 2002 to 2009, mining projects and expansions grew in line with the profitability of mining companies in Peru, due to the rise in the price of metals. And this growth resulted in a direct increase in fiscal revenues between 2003 and 2012 -with the exception of 2009, as a result of the international crisis (De Echave, 2016). Although the period of the mining boom was marked by a continuity in the main characteristics of mining tax policies, in certain periods, as De Echave mentions, there were some changes in those policies, basically generated by: 1) social and environmental protests; the claims of the company for a higher tax payment to the mining companies, given the extraordinary

8 To see more about the modifications that occurred in the mining legal framework, from these more structural reforms, you can read the detailed work done by Mendoza and De Echave (2016).

profitability, and 2) the pressure of the mining companies so that the tax stability that most governments had committed since Fujimori and onwards would not change , despite social conflicts (De Echave, 2016).

The debate on how much the miners had to pay gained ground in a part of the public opinion, appearing more and more in the public agenda the demand to collect a tax that compensated the extraordinary profitability that the mining companies were obtaining. And it was during the government of Alan García (2006-2011) that the prices of metals were at their highest point to which they had reached until then and with that, also the maximum mining profitability. So, in order to find a way out with the support of the big mining companies, the Garcia government proposed in 2006, as a first step, the "Mining Program of Solidarity with the People". According to Supreme Decree N ° 071-2006-EM, this program was a "voluntary, extraordinary and temporary contribution, subject to the international prices of metals being maintained above the reference levels for the effect established by the State and the companies, resources that will be credited in private funds ". Known also as "mining obbolo" or in general as "voluntary contribution", the fund would be used for works, projects or programs (such as educational or health programs, technical training, promotion of productive chains, basic infrastructure and works of local or regional impact, among others) destined mainly to the populations located in the areas where mining activities are carried out (SNMPE, s / d). According to De Echave, that contribution accounted for 3, 7% of net profits and most corresponded to companies that due to their tax stability contract, did not pay royalties (established only in 2004) and, therefore, that contribution replaced the collection of normal royalties. Added to this was the fact that some of the companies that contributed the most (such as Antamina, Cerro Verde, Yanacocha and Milpo) were covered by the tax benefit of reinvesting profits between 2001 and 2011, not paying the Treasury, a total of US $ 631 million (De Echave, 2016). However, according to Arellano, this agreement motivated social discontent and generated an image of "a government strongly committed to mining interests" (Arellano, 2008 - 67)

While the debate on extraordinary mining profits continued its course, conflicts against large mining companies in some territories of Peru grew. And even, in some communities, the rejection of mining corporations, due to the environmental consequences that large-scale mining could generate in their territories or to the few benefits perceived by the communities, contributed to the closure of certain mining projects. As in Chile and Argentina, Pascua Lama, a Barrick Gold mining corporation project were suspended, in Peru, the communities themselves paralyzed other large-scale mining projects such as Tambogrande, Río Blanco, Las Bambas, Tía María, among others.

These socio-environmental conflicts took the public agenda and in 2011, they constituted 41.7% of the total registered conflicts (Ombudsman of the Republic of Peru, 2012). And, in 2012, mining conflicts would add up to 105 cases, according to the report of the Supervisory Body for Investment in Energy and Mining (OSINERGMIN, 2016).

But this aspect which was deepening, was already perceived in 2008, year in which the Peasant Federation of Cotabambas announced a strike for the month of March as a protest for the management of the trust (see on the website of OCMAL). In this context and a few months after making "a call to not scare off private investment with requests such as the application of a tax on surplus profit" and to affirm that "the best thing to attract

investment is to provide security and stability", Alan García signed the Supreme Decree 147 that regulates the new Law 29230, of works for taxes (La República, 06/10/2008). Although in the next section we will detail this point, we can say that the Works for Tax Act is a mechanism by which the participation of the private sector in the financing, execution or maintenance of public works is allowed and encouraged, in exchange for a refund of the total expenses assumed by the private company, discounted from the taxes that it should pay to the Peruvian State. And although, the law does not limit this mechanism to the mining sector, we can affirm that its function is directed, mainly, to that economic sector. In 2016, of the total amount invested in works for taxes, 47% belonged only to two mining companies (Southern Peru Copper Corporation and Compañía Minera Antamina). This is how the Doctor in International Development, Maritza Paredes, explained the emergence of this policy in relation to the issue of royalties.

> "The government of Alan García coincides with the rise in the prices of metals and hydrocarbons, there was an expectation that it would be a time of greater growth and therefore the growth was going to be pushed by greater direct foreign investment, especially in natural resources. In the case of mining as well as in the case of hydrocarbons, oil in the Jungle (...) That influenced a lot to the government of Alan García. And there is also a discussion, because the prices of minerals and hydrocarbons are increasing, and with Fujimori there had been a set of facilities of all kinds on tax facilities, so there was a lot of criticism to Alan García's government and a need to discuss the payment of royalties. In reality, in Peru there had not been a serious discussion about what were the royalties paid by these companies to leave the communities, the territories, and the country. The VAT was paid, the income tax, but there was no payment for royalties, that is, for the extracted mineral. It is then, in this context, that Alan García decides, instead of putting a law for royalties, to put a voluntary bonus. But also the voluntary bonus comes with the 2007 earthquake in Paracas, with the idea that businessmen were going to take over the reconstruction of Paracas. But then all this discussion comes as background (...) "It was a way of saying that the companies were making a lot of resources and that they could be invested in the populations. "It was a way out of the royalties issue" (Interview No. 4, 11/10/2017)

Then, the law of works for taxes, would be the materialization of the second public policy tested by the Peruvian government to respond, first, to the public debate about whether the collection of royalties should be made based on the international price of minerals, due to the extraordinary profits that the mining activity was generating to the companies. The companies, obviously, showed their refusal to any increase in royalties or taxes in general. And, as we mentioned in the first section, a State tries - and more rapidly in the stage of globalization - to show more favorable conditions than those presented by other States to attract capital. Therefore, the explanation of the government of Alan Garcia not to increase royalties was that "to get more money to the companies who are getting more profits, scare others who want to invest" (The Republic, 06/10/2008). In this sense, the works for taxes policy would not generate any type of tax increase for companies and, therefore, would generate support from them when implementing it. And indeed, it happened.

Second, the Tax Works Act was a response to the growing social discontent generated by that image of a government committed to mining companies, by not formulating any policy that would demonstrate the development that mining would generate for the

Peruvian economy or the benefits that mining would bring communities, as President Alan García himself had argued in his article "El síndrome del Perro del hortelano" (García Perez, 2007).[9] Third, this law, while mitigating social conflicts, by noting the works that could be generated by large-scale mining, and avoid the management of local or regional governments, criticized for corruption and / or inefficiency to execute this type of projects - and so indicated by the international organizations and by the mining companies themselves. In this regard, in an interview said Epifanio Baca, Executive Coordinator of the Proposal Citizen Group, Peru, in an interview conducted by the author of this article (Interview No. 1, 03/14/2015):

> "I do not think people are making a conflict because they do not want mining, but because they perceive that in 10 years of mining they do not see the benefits, nor on the side of what the company has done directly, because this voluntary contribution had the largest amount. in Ancash with Antamina (...) There has been a lot of corruption. Then people see that they move a lot of money and everything. It is normal. Then he says "I also want to participate in that party". It is a common practice that if you, company or State want to build a highway, people block you (...) Then people immediately protest, but not to paralyze the project as in Conga, but to "negotiate".

And it also referred to the corruption that mining activity can generate, Oscar Schiappa-Pietra, Peruvian consultant of the Department of Energy and Extractive of the World Bank-GEEDR (Interview No. 2, 04/16/2015) said in an interview made by the author:

> "Because many societies that have abundant natural resources instead of making these resources levers and trying to be a development energizer, in general, tend to make these resources have regressive effects on development, on the institutionality on the quality of democracy, etc. (...) The experiences of much corruption, more possibilities of corruption, and social conflict. People see all this development that goes on before their eyes, they see trucks full of minerals spend all day on roads that years ago were absolutely inhospitable and people ask themselves: what's in it for me? What is there for us? When there is no adequate management of these resources, of this abundance of natural resources, conflict increases. But that is not a curse, as we would say, of divine mandate, of an act of nature, what makes the fundamental difference between having abundant economies in natural resources with positive results and those that do not, is the subject of institutionality".

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9 Alan Garcia said in his article "The Hortense Dog Syndrome": The third issue is the mining resources in which Peru has the largest wealth in the world, not only for the quantity but also for the variety of mining resources , or that allows, if a product goes down in price, it is compensated with other products. However, barely a tenth of these resources are in the process of exploitation, because here we still discuss whether the mining technique destroys the environment, which is a theme of the last century, of course it destroyed it before and today's environmental problems are basically by the mines of yesterday, but at present the mines coexist with the cities without problems and in any case that depends on how strict the State is in the technological requirement to the mining companies and in negotiating greater economic and labor participation for the departments where the mines are located (Alan García, 2007)

In this way Maritza Paredes explained the relationship between social conflicts, local governments and corporate pressure, as an explanation of the policy implemented by Alan García (Interview No. 4, 11/10/2017):

> "coincides with a time when conflicts reach their maximum expression. Then, the National Mining Society complains that the canon was not working, that the redistribution through the regional governments was not efficient, that the regional governments did not invest in the things that the people needed, that the spending of the national governments was very low. Then it was a way to give an open letter so that they can make their own projects".
>
> "Companies begin to question the way in which the rent they were leaving benefiting the communities where they worked and avoided conflicts ... Then it is a way in which the State tells them: they can make their own projects".

In this sense, this public policy was presented as a way to generate mechanisms that would strengthen "institutionality" when it comes to using the resources coming from mining. But, in addition, this measure sought to improve the image of mining companies before the communities. A technical advisor works for works for tax, in an interview conducted by the author, said that this modality "gives an alternative to companies in the mining sector to improve their relationship with communities belonging to their areas of operation" (Interview No. 3, 12/10/2017).

Therefore, works for taxes are presented as a direct response to social and environmental conflicts generated by mining activity in the territories and, in this sense, as a way to cushion these conflicts. The same agency of ProInversión in its web page, affirms that Law N ° 29.230 would generate benefits for the private company because "it improves the image and the programs of Social Responsibility". In this sense, the policy of works for taxes can also be explained as a new modality that acquires the old mechanism of Corporate Social Responsibility (CSR). In the words of Muñoz Garivía, CSR "comprises a vast and heterogeneous set of practices of a voluntary nature, in which they are usually considered from specific actions carried out through donations, to others of greater scope and systematicity, organized into projects and programs that address various fields of social life of the communities. Education, health, local economy, sport, culture, security, infrastructure, citizenship, among other aspects, are objects of it. It is possible to observe that the philanthropy traditionally practiced by companies is now renewed through other forms of social action that transcend private and community spheres, and encompass the public sphere of the State and civil society. "(Muñoz Garivía, 2017- 2)

Finally, this policy would serve to generate infrastructure works that can have two types of explanations depending on the type of work (and although in some cases the same work could have more than one function). The first type of works can be explained basically by the mentioned requirement of the social license of the communities. The companies would generate a better image before the communities when the works are presented as a result of the development of the mining activity. This type of function of the infrastructure work is related, especially, with those carried out for the improvement of educational services, for the creation of sports or health complexes, among others. In

the words of José De Echave, "the definition of the work that is going to be done, which will allow me to pay less taxes, is a function of achieving what the companies themselves call social license to operate. That is, to achieve the acceptance of the population. So, I, company, say: I will finance such a school, I will finance this medical post ... "(Interview No. 5, October 27, 2007)

The second type of works can be explained basically due to the role that States have of generating better material conditions for production, to which Altvater (1977) referred. This last case would be, for example, that of the works carried out for the improvement of roads, energy and telecommunications, etc. Explains José De Echave that "there are many roads that are financed that, in practice, not only allow companies to deduct taxes, but are roads that are based on their interests because companies are interested in roads being in better conditions so that the minerals they extract can pass through there "(Interview N ° 5)

This type of works can be understood, then, as a new form that acquires that old State function. We say new, because it has other characteristics. In the case of the mechanism of works for tax, the private sector could exercise itself the role of direct executor of the works or contractor, in addition to having the faculty to "direct their taxes in the projects of desire and in the areas of their interest ", as indicated by the Technical Advisor for tax works when interviewed (Interview N ° 3, 12/10/2017). However, what they have in common is that the works, although they are necessary for the productive process (for example, without roads and ports, it would be unthinkable that the product could be exported and, therefore, reach the market), not be profitable for at least one mining company, the costs of it fall into the hands of the State, whether or not the direct executor, to be carried out with public funds.

In relation to this last axis that we point out of this public policy, and in response to the question of how works arise for taxes and what body proposes it, the Technical Advisor for works for taxes explains that:

> "In May 2007, the IPE published the Research Document 'How to accelerate the execution of investment in infrastructure in Peru?', Which proposes various actions to boost investment in the regions and among them is proposed a Bill that proposes a mechanism for private companies to choose to pay in advance the Income Tax, through direct investment in infrastructure projects for public use. Subsequently, in July 2007, the National Unity Parliamentary Group (PPC and others) took up this proposal and converted it into a bill. In parallel, the Executive proposed a similar bill in September 2007, which called it "Build and Transfers ", also taking as a basis the study of the IPE and in which the form of payment to the private ones is proposed. Finally, the Economy Committee of the Congress unites the two bills in one, which is approved in plenary session of May 08, 2008, issuing Law No. 29230 (works for taxes) "(Interview No. 3, 12/10/2017)

Therefore, works for taxes were also presented as a response by the Peruvian State to the deficit in real infrastructure, which could also help, in the future, to improve favorable conditions for mining companies. That is, in this aspect, also the implementation of the law could be an attractive factor for future investors. But the explanation of how this policy arises cannot focus solely on the historical absence of public works. That would mean losing the complexity of this public policy.

So far we have seen the basic arguments of this public policy, and the functions that fulfills as a policy of attracting capital. Now let's see which ones are the special characteristics, which can be observed in the analysis of the text of the law itself.

5. Specific characteristics of Law No. 29,230

The law that establishes the mechanism of works for taxes was approved by Congress and published in the Official Gazette on May 20, 2008, just in December passed Supreme Decree 147-2008-EF that regulated it. After that regulation, came other decrees and other laws that would modify the original version, but leaving intact the central axes of the law. In what follows we will review these central points.

The first explicit objective of the law is to promote "the execution of public investment projects of regional and local impact, with the participation of the private sector, through the signing of agreements with regional and / or local governments." In relation to this, in principle, we must place this policy within the framework of a transformation of a historical function of the States to provide infrastructure within their territories, by opening up to private initiative and through the regime of Public-Private Partnerships (APP). In relation to this, says Mendez-Vásquez that:

> "As a consequence of the insufficient State budget, since the last century, the possibility of the active participation of individuals in the provision of these infrastructures has been admitted, without the State losing the possibility of intervening and supervising these benefits. One of the results of this opening to private initiative, the public sector has become a mere guarantor of the provision of works and services (...). Thus, it has gone from the old public works contract and the concession of public works to the most recent public-private collaboration contracts and *project finance* models "(Mendez-Vásquez, 2016-14)

But, the new policy of works for taxes, went even beyond the so-called APP regime, since it gave the possibility to the private sector to intervene in other functions that until then were exclusive of the State. That is why the website of ProInversión (Pro-investment)) States that this is "an innovative experience" and "is unique in the world."

This new policy focuses on a mechanism structured in certain steps that begin with the selection of a work project. Thus, local and regional governments must make a list of "priority projects" of public investment and send them to the body created to promote foreign investment, the Private Investment Promotion Agency (ProInversión). Once the list is finalized, the local or regional government may select the private company that has previously applied for a construction project. After that, governments and companies make an agreement for the financing and / or execution of one or more investment projects. It should be noted that the company not only has the possibility to choose from the list of works established in that list, but the same company can propose a project that seems relevant, according to Article 15 of the regulation approved by the current President Kuczynsky Godard, by Supreme Decree No. 036-2017-EF (but introduced, even before this decree). The presentation of the project, proposed by the private sector, must be done through a letter of intent that describes the project, the

problem or negative situation that affects the population, objectives, benefits of the project, estimated amount, and so on. But, in fact, says the economist and founder of CooperAcción, José De Echave, "there is a general spirit where finally the border between public and private is not very well defined", "and the strength of that logic of public policy converted in private initiative it is so marked that finally who defines the work is the company ... "(Interview N ° 5, October 27, 2017). Even if you have to clarify what the benefits are for the community, one of the aspects that is generally questioned in the tax works policy is that the company can select a project that is in its own benefit and that, with public funds, is finished financing a work that is not really of "public interest". For example, this may happen in the case of certain roads that are more useful for the company (as it is necessary for the material conditions of production of the mining activity) than for the communities (or at least, are not priorities for the community). Let's see an example that De Echave presents:

> "For example, in Peru there is now an area that is known as the mining corridor in the Andean south, which unites the provinces of Cotabambas, in Apurimac, where the great project is the Bambas, is the Chuguivilca province in Cuzco, where the Constancia project, and Espinar province are located, where the old Tintaya and Antapaccay mines are located. These provinces concentrate the largest flows of mining investment. And a corridor has been formed that has been named the mining corridor and it is clear that this mining corridor, which is unifying several mining production units, several mining companies, ... that mining corridor needs infrastructure, it needs a highway, at some point it needs a mineral-pipe, needs conditions for that production to leave, from that high Andean area and go to a port. Well, that is a clear example where, finally, that infrastructure responds to the strategy of mining expansion and does not respond to a development strategy of the area. The decisions are taken by extraterritorial actors. "(Interview No. 5, October 27, 2017).

But, in addition, the company can determine the estimated amount without requiring bidding, that is, a mechanism by which the public administration requests budget proposals for a work and from there, the most convenient one is selected. The absence of "normal" bidding mechanisms could encourage overpricing of the work in question, thus having a higher cost to the State than the market.

Another aspect of the implementation of this law is that which refers to the possible indirect privatization of the control of the service of the work and to a limitation in the facts of its use. That is to say, not only the tasks of elaboration of the project, hiring of personnel and execution of the work can be transferred to the own private company, but also the tasks of control. And in this sense, this way of privatizing the control of the work, generally, is accompanied by a greater limitation of the use of a supposedly public service. For example, both at the time of construction of a road and at the time of maintenance, the passage can be limited by the "normal" mechanisms of the work (say, for road safety). This was explained by José De Echave in the interview conducted by the author: "what finally happens is that this work that has been built by works for taxes and that is a public work (that is, the private company has done it, but it is a public work), ends with a control of the private company. Then, they appear at the checkpoints and establish who passes and who does not pass, and suddenly the public highway ends up being controlled by the private company. "(Interview N ° 5, October 27, 2017).

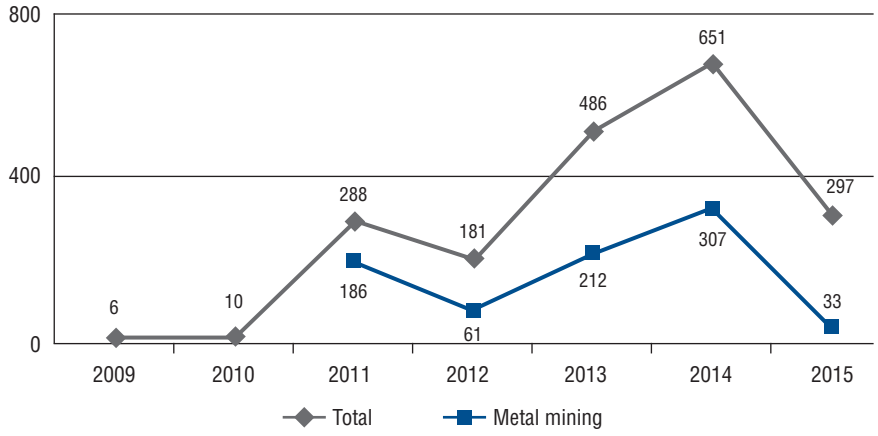
Regarding the mechanism for the return of the amount of the investment made for the selected work, in addition to the benefit of the total collection of that amount, there is an extra benefit. Let's see. At first, the company is granted a certificate called "Regional and Local Public Investment - Public Treasury" (CIPRL), issued by the National Directorate of the Treasury, which can be canceled (valid for 10 years) by means of taxes that the private company should pay, in concept of Income Tax and up to fifty percent of said tax corresponding to the previous year (hence the name of "works for taxes" by which this law is known). But, also, according to article 7 of the law, in case the CIPRL have not been used in the corresponding fiscal year, because the total amount of the work exceeds that limit of fifty percent of the income tax that the company, as stipulated, may be used, may be used in the following fiscal years, in which will be added a two percent per year of that amount. In other words, if the amount of the work chosen by the company exceeds the limit of what is stipulated by law, that will be rewarded with a kind of interest and leaving the State indebted to the company, until it decides to cancel it. In this sense, according to Carlos Bedoya (lawyer and journalist, specialist in issues of "tax justice"), "the mechanism of works for tax is one more link in the aggressive tax machinery so that the greater amount of taxes of the large companies are reduced, as happened with Yanacocha, which ended in 2013, in 2014 and 2015, not paying taxes. Not paying taxes has to do with attacking profits, that is, filling them with costs "(Interview N ° 6, 02/10/2017). However, this would only be one of the aspects that the measure has, which would of course encourage more mining companies to adhere to the mechanism of works for taxes. But only this aspect, as we saw in the previous section, would not explain the function of this policy.

Regarding the funds, we must also add that the certificates received by private companies, according to article 8 of the law, have as their source of financing the canon, the customs income and the shares received by the corresponding regional or local government. Therefore, the funds that are used for the works in question, will be deducted from the future annual transfers of the Source of Financing of Determined Resources from the Canon and Surcharge, Royalties, Customs Income and Participations made in favor of the regional governments or premises (article N ° 12). Therefore, this measure also translates as a transfer of competencies from the different levels of governments (including national government entities, which were incorporated in the latest modification of the law) to private companies, but not a final transfer of the cost. , since it would be those who would finally pay for the work. This is because, as mentioned, the amount invested by the company would be deducted from the fund from the fee that should be received by regional or local governments. But, on the other hand, it also means that local[10] or regional governments are indebted for an amount that will be discounted (30% of the total income by royalties, etc.) every year until the total amount that was used is completed for the work.

Finally, with respect to who can be the "bidder" of this mechanism -as the law calls it-, that is, which private companies can intervene in the process, the law does not present restrictions regarding the economic sector to which the company must belong . However, although in theory any company could participate in this mechanism, mining companies have been the most used by this mechanism and, after them, Banco de Credito del Peru. Thus, the growth of the general execution of amounts invested in works for taxes has been proportional to those invested by the mining sector, as can be seen from figure 4.

10 It should be noted that the fee is not a separate tax but a distribution of income tax.

Graph 4
Works for taxes: investment executed and / or committed 2009-2015



Source: www.obrasporimpuestos.pe - **Elaboration:** CooperAcción.

To give an example of the majority participation of mining companies in works for taxes, in 2011, year in which mining companies began to participate in this mechanism, of the total amounts invested, 60% belonged to the company Southern Peru Copper Corporation, with a total of 170 million soles (see table 1). And this is explained, basically because there are few companies that can deduct an amount of their taxes of such magnitude that infrastructure works can be carried out. That is to say, there are few companies that generate profits like the transnational mining companies.

Table 1
Executed and committed investment of mining companies in respect of works for taxes (millions of soles)[11]

Nº	Enterprice	2011	2012	2013	2014	2015	2016	2017[(1)]	Total 2009-2017[(1)]
1	Southern Peru Copper Corporation	170,0	21,2	119,1	183,0	27,4	58,6	–	579,3
2	Compañía Minera Antamina S.A.	–	–	12,2	79,1	5,4	286,3	10,5	393,6
3	Volcan Compañía Minera S.A.A.	11,3	26,8	57,3	4,3	4,2	–	22,0	125,9
4	Compañía Minera Milpo S.A.A.	4,0	3,8	–	4,5	–	24,9	3,9	41,1
5	Minera Barrick Misquichilca S.A.	–	7,5	9,0	21,8	–	–	–	38,2
6	Yura S.A.	–	–	–	15,4	–	–	13,1	28,5
7	Minsur S.A.	–	–	–	–	5,9	–	21,7	27,7
8	Shougang Hierro Peru S.A.A.	–	–	–	–	–	23,2	–	23,2

11 This table was prepared based on an original PROINVERSION table of "RANKING OF COMPANIES BY INVESTMENT AMOUNT IN WORKS FOR TAXES 2009 - 2017". From that original table, we made a selection of the amounts invested by the mining companies, as the new table States.

Nº	Enterprice	2011	2012	2013	2014	2015	2016	2017(1)	Total 2009-2017(1)
9	Compañía de Minas Buenaventura S.A.A.	–	–	–	6,0	–	–	13,2	19,1
10	Minera Gold Fields Peru S.A.	–	–	18,5	–	–	–	–	18,5
11	Cía. Minera Poderosa S.A.	–	–	12,9	2,6	–	–	–	15,5
12	Consorcio Minero Horizonte S.A.	–	–	–	2,9	–	–	1,3	4,2
13	Cía Minera Antapaccay	–	–	–	3,3	–	–	–	3,3
14	Xstrata Tintaya S.A.	–	–	3,1	–	–	–	–	3,1
15	Minera La Zanja S.R.L.	–	–	0,4	–	–	–	2,6	3,0
16	Sociedad Minera El Brocal S.A.A.	–	2,9	–	–	–	–	–	2,9
17	Brynajom S.R.L.	–	–	–	1,7	–	–	–	1,7
18	Hudbay Perú S.A.C.	–	–	–	1,3	–	–	–	1,3
19	Chinalco	–	–	–	1,0	–	–	–	1,0
Total General		**185,23**	**62,23**	**232,51**	**326,80**	**42,97**	**392,98**	**88,37**	**1.331,09**

Own elaboration based on ProInversión data (2017).
(1) At 17 October 2017.

6. Final considerations

Looking to answer the questions referred to the genesis, especially its functions and the foundations that sought to legitimize works for taxes, we focused on: the context of the mining boom and the general factors that contributed to the development of this activity in Peru, as well as in several countries of the region; in the identification and conceptualization of public policies to attract investments, in the immediate antecedents of Law 29,230, in the functions that can be derived from the analysis of this mechanism, as well as in the central characteristics of the law.

Regarding the factors that contributed to the growth of the mining sector in Peru, as in several countries in the region, we explained that one of the most influential was the development of a legal framework favorable to mining companies. This legal framework was the materialization of a set of public policies that sought to show greater favorable conditions for the attraction of capital to the Peruvian mining sector, in order to be able to territorialize a portion of global capital, in the form of FDI. In this international context where the accelerated competition of the States for the attraction of capitals leads them to implement policies that improve the conditions for the establishment of the companies, it is that works for taxes are born. But as we saw in the second section, public policies are positions taken by States (or responses) to socially problematized issues. Then, these two imperatives are given to which the State is subject and which do not always give convergent results. On the one hand, States seeking to attract capital and generating policies in pursuit of attraction. And, on the other hand, States having to respond to issues such as, for example, the public debates that are generated around a topic demanding a certain policy and social conflicts. In this sense, the case of the policy of works for taxes, is the result of these two imperatives and had the purpose of seeking a measure in which both converged.

Throughout this article we seek, in principle, to answer in what sense works for taxes is a policy of attracting capital. We saw that, according to the definition of Oman (1999), works for taxes would be incorporated into the policies of attraction of investments "via incentives", this being both a) a fiscal incentive, and b) an indirect incentive, given the possibility of improving the material production conditions of the companies themselves, especially with regard to the improvement of the conditions for moving the merchandise (as is the case with the creation of roads). And, in turn, as a way to improve the image of mining companies in front of the discontent of communities.

Therefore, as we mentioned at the beginning of the article, works by tax would be a response of the Peruvian State to the public debate on the extraordinary profits that the mining companies have in the moments of rise in the international prices of metals, to the demands by the few benefits generated by this activity in the territories, and social conflicts this entails (not so, conflicts due to environmental demands), and the absence of material conditions for the production necessary for the mining companies themselves. But that, at the same time, generates an incentive for the attraction of foreign investments to the mining sector.

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Mobility of labor income during the boom and post-boom of commodities: the case of Peru

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Abstract

The article contributes to the study of economic transformations in Peru during the periods of the boom (2007-2011) and post-boom (2011-2015) in terms of the mobility of labor income. Through the use of longitudinal databases and the estimation of mobility index in absolute and relative terms, the results reveal a reduction in mobility levels from one period to another. The analysis of mobility by groups of workers shows that during the boom period, those groups that initially presented low average labor income, were, in many cases, those which presented higher levels of mobility compared to their counterparts. On the contrary, during the post-boom period, many of groups with high initial income presented higher levels of mobility than the rest. It is concluded that the income convergence process experienced during the first period, lost intensity, although it was not completely reversed in the post-boom period.

Key words: income mobility, commodities (raw resources) boom, income convergence, Peru.

1. Introduction

During the so-called "commodity boom" the Peruvian economy had the highest growth rates in Latin America: between 2002 and 2011 its average growth was 6% (reaching a peak of 9.8% in 2008), doubling the average of the region[1]. The high growth rates were accompanied by a drop in inequality indicators. For the period 2002-2011, income inequality per capita per household measured by the Gini coefficient decreased by 7.8 points from 53.0 to 45.2. The reduction in inequality in Peru was also greater than the fall of 4.0 points in the Gini coefficient that the region experienced on average. Motivated by the positive development of the economy in terms of growth, macroeconomic stability

1 All the data in this section are from CEPALSTAT.

and reduction in poverty and inequality, some experts called this episode "the Peruvian miracle"[2]. A series of studies indicates that the main reason for the decrease in income inequality was the reduction of labor income inequality[3].

However, this period came to an end in mid-2011. Although the boom in raw materials, which boosted economic growth, meant for Peru an increase in the terms of trade in 78% from 2003 to 2011, the fall of international prices caused a reduction in the terms of trade in 13% from 2011 to 2014. With the end of the boom the Peruvian economy slowed down, between 2011 to 2016 its average growth was 3.2% (with a drop to 1% in 2004). Faced with this new scenario, this article answers the questions: what socio-economic transformations in terms of mobility occurred during the boom period? And, were these sustainable transformations reversed during the post-boom period? The hypothesis which underlies the analysis, is that during the boom period a convergence of labor income was experienced, but that it was reversed in the post-boom period.

Socio-economic transformations are commonly measured in terms of inequality. However, measures of inequality only show changes in the dispersion of income and do not show who has benefited from the rapid economic growth. Therefore, the inequality approach provides a static view of income distribution. This idea can be clarified with the following example.

It is assumed that the income distribution of a society composed of only two individuals (A and B) is given as Y: (A: 100, B: 150) in the initial period and a period after it changes to Z: (A : 150, B: 100). Given the scenario described, it can be affirmed that the inequality remained constant; however, there have been transformations within the distribution. It is observed that changes have taken place both in the monetary income (absolute changes) and in the positions of the individuals within the distribution (relative changes). Individual A has presented an increase in his income which has allowed him to go from being the poorest in the initial period, to being the richest in the final period. Conversely, individual B, who had the highest income in the initial period, has experienced a reduction in his income and as a result, he goes from being the richest in the initial period to being the poorest in the final period.

The example shows that changes in individual income are ignored from the inequality approach. In this sense, the concept of income mobility, which refers to the movements of the income of individuals or their position within the distribution of income (that is, in absolute or relative terms), is appropriate to capture the dynamics within the distribution of income and the evolution of the welfare of individuals. In addition, the importance of mobility analysis lies in the expectation that a society with greater mobility will be a more fair society and lead to greater equity.

Therefore, to answer the research questions regarding the type of socio-economic transformations that took place during the boom period and its sustainability during the post-boom period, the article proposes two steps. The first step is to measure and compare

2 See: Waldo Mendoza, Peruvian Miracle: Good Luck or Good Policies ?, (Pontifical Catholic University of Peru, 2013).

3 See: Joao Azevedo et al, Decomposing the Recent Inequality Decline in Latin America, (World Bank, 2012) And, Luis F. López-Calva and Nora Lustig, Declining inequality in Latin America: A decade of progress ?, (Brookings Institution Press , 2010).

the magnitude and direction of mobility for the boom and post-boom periods (2007-2010 and 2011-2015, respectively). And the second is to measure mobility for different groups of workers (by quintiles, age groups, level of education, gender, sector of the economy, sector of activity and area) in both periods. In this way, at the end of the analysis it will be possible to answer which workers benefited from the raw materials boom, and to evaluate the hypothesis regarding whether the economic transformations led to a convergence of income and if this was reversed over time.

The literature regarding monetary mobility in Peru focuses on the dynamics of poverty and is based on the analysis of changes in household consumption. The first study on monetary mobility in Peru was that of Glewwe and Hall (1998)[4]. The authors found evidence that for the first half of the 1980s, in the context of the "heterodox" adjustment in Peru, vulnerability to macroeconomic shocks, was lower for those households headed by women and by people with a higher level of education. In subsequent studies on monetary mobility in Peru, Herrera (1999)[5] found that during the period 1985-1996 the city of Lima experienced great extent of mobility in levels of consumption, and changes in status between "poverty" and "non-poverty". By expanding his analysis for the 1997-1999 period, characterized by a contraction in the economy, Herrera (2001)[6] finds that there was mobility within the income distribution. In his study on the evaluation of economic policies, Grimm (2007)[7] finds that for the period 1997-1999 the growth rate in the consumption of initially poor households was more than that of the rest of the households, that only 10% of the households in their sample benefited from economic growth experiencing upward mobility, while 12% of households in the sample went into a state of poverty. To my knowledge, there are no studies to date on mobility that focuses on labor income in Peru.

This article contributes to the literature in two aspects. First, it expands the limited literature on income mobility in developing countries. And second, it complements the studies on income distribution in Peru and explores the sustainability of economic and social transformations in a context of change from an expansive phase to a deceleration phase.

The article is organized in the following manner. Section 2 describes the conceptual and methodological framework on which the analysis is based. In section 3, we present the longitudinal databases that are worked on, as well as the variable of interest of the study. In section 4, the characterization of the labor market is developed based on the information of the samples. In section 5, the analysis of aggregate mobility is presented for each sample and by groups. In addition, socio-economic transformations are evaluated

4 See: Glewwe, Paul and Gillette Hall. Are some groups more vulnerable to macroeconomic shocks than others? Hypothesis tests based on panel data from Peru. Journal of development economics 56, No. 1 (1998): 181-206.

5 Herrera, Javier. "Ajuste económico, desigualdad y movilidad", Document de Travail DT/99/07 (1999).

6 Herrera, Javier. "Dynamics of poverty in Peru, 1997-1999". Document de travail DIAL (2001): 09-2001.

7 Grimm, Michael. "Eliminar el axioma del anonimato al evaluar el crecimiento a favor de los pobres". Journal of Economic Inequality 5, n.º 2 (2007): 179-197.

during the boom period and their sustainability is explored during the post-boom period. Finally, in section 6, the conclusions of the article are presented.

2. Conceptual and methodological framework

The notion of income mobility has several interpretations. Fields & Ok (1999) [8] define the mobility of income as a multi-faceted concept and warn that as a result of this characteristic, there is no unified theory for the concept and its measurement. Therefore, the evaluation of different aspects of this concept can lead to opposite results in terms of the level of mobility in a society. Consequently, it is necessary to define what notion of mobility is going to be analyzed. Of the large number of notions that exist in the literature, this article will analyze two types of mobility: one that measures the absolute aspect and another that measures the relative aspect. The concept of mobility in absolute terms will allow us to measure the magnitude and direction of changes in income. While the concept of mobility in relative terms, will allow to evaluate the hypothesis of convergence of income. Next, the index by type of mobility are explained.

2.1 Absolute mobility

Absolute mobility refers to changes between the initial and final income of the individual. To measure this type of mobility, Field and Ok suggest the use of the directional mobility index. This index measures the average of changes in income. In this article, this indicator is measured in two ways: the first (1) is taking the income in monetary units and the second (2) is taking the logarithmic form of the income. The second measure has the advantage of highlighting the changes of lower-income workers. The indicators are specified as follows:

$$\overline{\Delta y_n} = \frac{1}{n}\sum_{i=1}^{n}(y_{it} - y_{it-1}) \qquad (1)$$

And in its logarithmic form:

$$\overline{m_n} = \frac{1}{n}\sum_{i=1}^{n}\left[\ln(y_{i,t}) - \ln(y_{i,t-1})\right] \qquad (2)$$

Where y is the annual income of individual i in year t. Individual i belongs to the sample of size n. The index are interpreted as the change in average income.

8 Fields, Gary S., and Efe A. Ok. "The measurement of income mobility: an introduction to the literature." In Handbook of income inequality measurement, pp. 557-598. Springer Netherlands, 1999.

The main advantage of the directional mobility index is that it takes into account both the magnitude and the direction (increases or decreases) of changes in income. Given that it measures absolute changes in income, it is possible for all individuals to experience upward (or downward) mobility at the same time, as well as for an individual to experience mobility even though their relative position remains the same.

For the purposes of this article, the directional mobility index is calculated first for the entire sample of each period. In this way, the magnitude and direction of the change in labor income is determined in an aggregate manner. Subsequently, the same calculation is made for different groups of workers and in this way determines who benefited the most and who less in each period.

2.2 Relative mobility

The second concept to analyze is that of relative mobility. The indicator proposed by Fields and Ok to measure this type of mobility is called "dependence of origin"[9]. This indexer measures the degree to which the initial economic condition determines the final economic condition of the individual. The economic condition can be understood as the level of income or the position of the individual within the distribution of income. The greater the level of dependence between the initial and final condition, the lower the degree of mobility. In "dependence of origin", the notion of mobility is relative to the initial condition of the individual. This type of mobility is usually measured by the transition matrices in quintiles (3).

$$(P) = \begin{bmatrix} p_{1,1} & \cdots & p_{1,5} \\ \vdots & \ddots & \vdots \\ p_{5,1} & \cdots & p_{5,5} \end{bmatrix} \qquad (3)$$

This matrix (P) classifies individuals according to five income categories of equal size. The rows indicate the quintile of belonging in the initial year and the columns the quintile of belonging in the year final. The cells located on the diagonal ($p_{1.1}$, $p_{2.2}$, $p_{3.3}$, $p_{4.4}$, $p_{5.5}$) show the percentage of workers who maintained the same quintile, that is, in the same relative position.

$$(I) = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix} \qquad (4)$$

$$(Q) = \begin{bmatrix} 0.20 & 0.20 & 0.20 & 0.20 & 0.20 \\ 0.20 & 0.20 & 0.20 & 0.20 & 0.20 \\ 0.20 & 0.20 & 0.20 & 0.20 & 0.20 \\ 0.20 & 0.20 & 0.20 & 0.20 & 0.20 \\ 0.20 & 0.20 & 0.20 & 0.20 & 0.20 \end{bmatrix} \qquad (5)$$

9 Also known as dependence in time due to its name in English time dependence.

If the final income depended totally on the initial income, then the matrix would be an identity matrix (4). If, on the other hand, the final income were totally independent of the initial income, the individuals of each initial quintile would be equally distributed in each final quintile (5). Based on the information from the transition matrix, the independence index can be calculated.

$$Índice\ de\ movilidad\ relativa = 1 - \rho(y_{t=1}, y_t) \qquad (6)$$

The independence index is measured based on the Pearson[10] correlation coefficient. In formula (4) the mobility index is derived as 1 minus the correlation coefficient r between the initial income and $t = 1$ and the final income yt. This coefficient can take values from -1 to +1, where +1 means perfect association and -1 a perfect independence between the two variables.

As noted at the beginning of this section, the absolute mobility and relative mobility index described above are not comparable to each other. For example, an individual may experience ascending absolute mobility since his monetary income increases from one period to another, but at the same time he may have low relative mobility if his final income has a high correlation with the initial income.

To verify the hypothesis that underlies this analysis on the convergence of income, two steps are taken. First, it is determined who are the groups of workers that present an average higher labor income (this is known as the determination of the initial advantage). Then, the relative mobility index is calculated both for the aggregate sample for each period, as well as for the different groups of workers. If those groups of workers that present an average higher labor income also show the lowest relative mobility indexes, the hypothesis of convergence of income is checked. If, on the other hand, these workers experience the highest rates of relative mobility, the socio-economic transformations would correspond to processes of divergence of labor income.

3. The data: panel samples ENAHO 2007-2011 and 2011-2015

The National Household Survey on Living Conditions and Poverty (ENAHO), prepared by the National Institute of Statistics and Informatics (INEI) since 1995, has an annual frequency and national coverage. Recently, INEI has developed two panel databases for the years 2007-2011 and 2011-2015, based on samples designed for this purpose. The objective of these surveys is to measure changes in living conditions and levels of poverty of the population over time. The ENAHO questionnaires are organized into four modules: characteristics of housing and the home, education, health and employment and income. In this article we use the information from the education and employment and income modules.

For the construction of the databases, the INEI divides the sample of the initial year of each panel into twelve sub-samples of similar size. The ENAHO Panel samples for the

10 Other correlation measures can also be used, such as the Cramer V correlation coefficient or the Spearman rank correlation coefficient.

2007-2011 period contain 4 sub-samples, while for the 2011-2015 period these were extended to 5 sub-samples. Therefore, the sample of the second period is greater than that of the first period. Due to the 20% rotating sampling rate, where said percentage of respondents is replaced by new respondents each year, the size of the panel sample decreases as the waves expand (this is how the years within the panel are called). In addition, the panel sample has a 5-year life span. That is, panel samples 2007-2011 and 2011-2015 contain information from different households, but selected under the same methodology.

The unit of analysis in this study is the individual. Given that we focus on the dynamics of the labor market, the individuals under consideration are defined as individuals of working age, that is, over 14 years old, as indicated in Peruvian legislation. The panel samples contain information on 2,618 and 4,942 individuals older than 14 years for the periods 2007-2011 and 2011-2015, respectively[11].

It is important to mention that the annuity feature of the data is an advantage over other mobility studies. In previous studies, quarterly data have been used to measure the mobility of consumption and the dynamics of poverty within a year. Such short frequencies tend to overestimate mobility since they show a lot of volatility. While the longitudinal data with annual frequencies, allow a better measurement of mobility as indicated by Shorrocks[12] (1978).

In studies on income mobility, especially for industrialized countries, the analysis is made on the basis of wages, since most people work as employees, in a relationship of dependence with an employer, in the framework of a contract that establishes their working conditions. However, and as shown in the next section, in the case of developing countries, and Peru is not an exception, labor markets have other types of labor arrangements that dominate labor relations. Other characteristics of labor markets in developing countries, is that many individuals have more than one job and that income is not exclusively paid in monetary form; but also, in kind. Given that the interest of this study is to analyze mobility based on income from the labor market, and with the objective of reflecting the reality of workers in Peru, the variable of interest "labor income" is defined as income (monetary, and in kind) of salaried workers and earnings of independent workers (self-employed and employers) in all their occupations. The variable "labor income" is constructed from deflated and annualized values calculated by the INEI.

It is important to mention that the literature warns of the use of the observed disposable income variable, that is, the reporting in the find, due to the existence of a potential underestimation by individuals. This problem is difficult to correct. However, as indicated by Atkinson & Bourguignon (2000)[13] if it is assumed that the low income report is constant during the period of analysis, the study of the changes in the distribution over time (as is the case of mobility studies) can be less problematic.

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11 Annex 1 shows the number of individuals for different panel sizes. A smaller number of individuals is observed as they add more waves (years) to the panel. As mentioned above, this "natural" loss of data is due to the sampling process.

12 Shorrocks, Anthony F. "The measurement of mobility." Econometrical: Journal of the Econometric Society (1978): 1013-1024.

13 Atkinson, Anthony Barnes, François Bourguignon, and C. C. Morrisson. *Income Distribution: Empirical Studies of Earnings Mobility*. Psychology Press, 2002.

4. Characterization of the labor market

This section consists of two parts. In the first part, the general characteristics of the labor market are presented based on panel samples 2007-2011 and 2011-2015. This analysis prior to mobility allows to identify how the workforce is distributed, what is the occupational structure and what are the levels of informality in the sample. In the second part, the initial conditions of the different groups of employed persons that have been identified are analyzed, that is to say, who presented in 2007, at the beginning of the analysis period, the highest labor income within each group.

4.1 General characteristics

The population of working age

The working-age population (PET), that is, individuals from 14 years of age, can be part of the workforce or be outside of it, that is, be inactive. The labor force in turn contains the employed and the unemployed[14]. Table 1 shows the distribution of the PET for the panel samples between the three mentioned statuses. The distribution of the individuals of the samples is on average: 75% of employed, 2% of unemployed and 23% of inactive. It can be observed that during the 2007-2011 boom period, the employment rate of individual's increases due mainly to the reduction of the inactivity rate and, to a lesser extent, of unemployment. Conversely, the occupancy rate decreases for individuals during the post-boom period 2011-2015, increasing the inactivity rate. This could suggest that in the second period the economic conditions affected the generation of employment in the sample. It should be noted that the low level of unemployment is a characteristic of the labor markets of developing countries. The low coverage and deficiencies of the social protection system (unemployment, health and pension insurance) oblige individuals to keep themselves occupied.

When disaggregating these data by gender, Table 2 shows that although the employment rate has had a similar trend for both sexes in both periods, the percentage of employed men is much higher than that of women: 84% vs 67% on average. This would mean that during those eight years of analysis, the samples do not show changes in the labor participation gap by gender. It is also observed that the percentage of women in inactivity doubles that of men: 31% vs. 14%, approximately. Finally, Table 3 shows the occupation rates by gender and age groups of the samples. The results suggest that the

14 According to the 13th International Conference of Labor Statisticians (CIET), those who declared that they have done some work (even if it is only for one hour) in exchange for a monetary or in-kind income, or who were counting with some job to which they would return after an excused absence (illness or accident, vacation, strike, etc.), during the reference period (in the case of ENAHO, one week). And unemployed individuals are considered unemployed (who stated that during the reference period, they do not have a job or have worked at least one hour in economic activities), that they are available for work and that they are actively looking for a job.

increase in the total employment rate during the boom period has been driven by the increase in the employment rates of the group of the youngest (14-24 years) by men, and to a lesser extent, of the group of older women (51 years old and over). This table also shows that, on average, over 90% of men and 70% of women between the ages of 25 and 50 are employed. In addition, on average, more than 70% of men and about 50% of women over 65 are employed. The high rate of employment of older adults, older than the retirement benchmark (65 years), reveals high levels of precariousness in the labor market.

Table 1
Distribution of the working-age population

Status	Panel 2007-2011					Panel 2011-2015				
	2007	2008	2009	2010	2011	2011	2012	2013	2014	2015
Occupied	74,9%	73,9%	75,1%	74,7%	76,4%	75,2%	75,5%	75,8%	75,2%	74,9%
Openly unem-ployed	2,6%	2,0%	2,0%	1,8%	2,0%	2,2%	2,0%	2,0%	1,7%	1,7%
Inactive	22,5%	24,1%	22,8%	23,4%	21,5%	22,5%	22,5%	22,1%	23,0%	23,3%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Source: ENAHO panel 2007-2011 and 2011-2015, INEI. Own elaboration.

Table 2
Distribution of the working-age population by gender

	Panel 2007-2011					Panel 2011-2015				
	2007	2008	2009	2010	2011	2011	2012	2013	2014	2015
Men of working age										
Working	83,3%	82,3%	84,0%	83,6%	84,7%	83,7%	84,4%	84,1%	84,3%	83,7%
Open unemployed	2,8%	2,5%	1,8%	2,1%	2,6%	2,4%	2,0%	2,3%	1,9%	1,5%
Inactive	13,9%	15,2%	14,2%	14,3%	12,8%	13,9%	13,2%	13,6%	13,7%	14,8%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Women of working age										
Working	67,2%	66,1%	67,0%	66,4%	68,9%	67,2%	66,7%	68,0%	66,7%	66,7%
Open unemployed	2,4%	1,5%	2,2%	1,5%	1,5%	2,0%	2,0%	1,8%	1,5%	1,9%
Inactive	30,4%	32,3%	30,8%	32.0%	29,6%	30,9%	31,3%	30,1%	31,9%	31,4%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Source: ENAHO panel 2007-2011 and 2011-2015, INEI. Own elaboration.

Table 3
Employment rate by gender and age

	Panel 2007-2011					Panel 2011-2015				
	2007	2008	2009	2010	2011	2011	2012	2013	2014	2015
Working men										
14-24	59,0%	56,9%	60,2%	63,2%	69,0%	59,8%	61,3%	58,8%	59,2%	59,1%
25-50	96,1%	94,5%	94,1%	92,8%	92,7%	94,7%	95,2%	95,2%	94,7%	98,2%
51-65	89,8%	90,0%	90,6%	91,7%	90,8%	92,0%	92,9%	93,3%	92,7%	98,0%
Older than 65	71,2%	70,6%	75,5%	68,7%	67,2%	72,6%	74,2%	71,0%	71,2%	70,8%
Working women										
14-24	46,6%	44,0%	43,7%	46,8%	54,0%	46,0%	46,8%	49,3%	49,1%	49,2%
25-50	78,1%	76,1%	77,5%	74,0%	74,3%	76,6%	74,9%	76,7%	74,7%	76,6%
51-65	73,0%	73,5%	74,9%	76,1%	76,7%	69,9%	69,9%	72,0%	70,6%	67,2%
Older than 65	47,8%	48,6%	46,2%	46,0%	51,7%	51,5%	54,7%	50,9%	50,0%	48,3%

Source: ENAHO panel 2007-2011 and 2011-2015, INEI. Own elaboration.

Categories of occupation

Table 4 shows the occupational structure, that is, the distribution of employed persons among the different types of employment established in the ENAHO. The table reveals that on average during both periods about 50% of workers are employed as independent workers (employers and self-employed workers). This percentage is higher than that corresponding to dependent workers: on average, 33% of those employed in the samples work for a company or household (employees, and domestic workers). Another very important feature of the Peruvian labor market is that approximately 16% of employees work in some productive activity without remuneration (unpaid family worker). However, the table shows a decreasing trend in the percentage of workers in this type of occupation, which could be related to the rapid economic growth experienced during the boom. For the analysis of mobility of labor income, this group will be excluded since their labor income is zero.

Table 5 shows the average occupational structure in each period by gender. This table reveals important patterns of gender segregation. While both genders are represented within the independents, men dominate in the employer category: approximately 72% vs. 26%, for men and women, respectively. Within the independent category, the category of employer is related to greater empowerment, since it is related to the possession and leadership of the company. Among the dependents, domestic work is practically exclusive to the female gender. Finally, a very important information from this table is that, on average, 79% of unpaid family workers are women. This reveals that women are more vulnerable to poverty.

Table 4
Occupational structure

	Panel 2007-2011					Panel 2011-2015				
	2007	2008	2009	2010	2011	2011	2012	2013	2014	2015
Independent worker										
Employer	6,7%	6,6%	6,3%	6,3%	6,1%	6,8%	6,6%	4,9%	5,5%	5,3%
Self employed	41,8%	41,7%	43,2%	42,9%	44,2%	43,8%	44,5%	44,4%	44,6%	43,5%
Total	48,4%	48,4%	49,5%	49,2%	50,3%	50,6%	51,0%	49,3%	50,1%	48,8%
Dependent worker										
Wage earner	14,0%	14,4%	15,4%	16,1%	16,6%	14,5%	16,0%	17,6%	17,1%	17,5%
Worker	16,5%	18,4%	16,9%	18,8%	17,0%	16,5%	16,9%	16,1%	17,2%	18,2%
Domestic employee	2,1%	1,9%	1,9%	1,6%	1,8%	1,5%	1,4%	1,4%	1,5%	1,6%
Total	32,6%	34,8%	34,3%	36,5%	35,4%	32,5%	34,2%	35,2%	35,9%	37,3%
Unpaid family worker	18,8%	16,5%	16,1%	13,9%	13,7%	16,7%	14,4%	15,3%	13,8%	13,7%

Source: ENAHO panel 2007-2011 and 2011-2015, INEI. Own elaboration.

Table 5
Occupational structure by gender

	Panel 2007-2011			Panel 2011-2015		
	Men	Women	Total	Men	Women	Total
Independent worker						
Employer	74,4%	25,6%	100,0%	71,8%	28,2%	100,0%
Self Employed	56,1%	43,9%	100,0%	56,8%	43,2%	100,0%
Total	58,5%	41,5%	100,0%	58,6%	41,4%	100,0%
Dependent worker						
Salaried	47,8%	52,5%	100,0%	49,0%	51,0%	100,0%
Worker	79,0%	21,0%	100,0%	78,4%	21,6%	100,0%
Domestic Employee	1,1%	98,9%	100,0%	2,6%	97,4%	100,0%
Total	61,0%	39,0%	100,0%	61,3%	38,7%	100,0%
Unpaid family worker	20,7%	79,3%	100,0%	21,3%	78,7%	100,0%

Source: ENAHO panel 2007-2011 and 2011-2015, INEI. Own elaboration.

Informality

A common feature of developing economies is informality. In this paper, the formal and informal sectors are defined based on the legality approach. Therefore, the formal sector includes public companies and private companies registered in the tax system. While the informal sector is made up of private companies that are not registered in the tax system. Table 6 shows that the vast majority of workers in the sample work in the informal sector of the economy, but there is a trend towards formalization both in the 2007-2011 period and in 2011-2015. Table 7 shows the results by gender. The data suggest that the process of formalization during the boom period was also driven by men and women, while the process of formalization during the post-boom was generated mainly by an increase in the participation of women in the formal sector.

Table 8 shows the average profile of formal and informal workers in terms of their level of education. It is revealed that high levels of education could determine access to the formal sector in both periods: while more than 50% of informal workers have only complete primary level or less (from 0 to 6 years of study), while more 40% of formal workers have some type of higher education (at least 13 years of study).

Table 6
Distribution of employed persons by sectors of the economy

	Panel 2007-2011					Panel 2011-2015				
	2007	2008	2009	2010	2011	2011	2012	2013	2014	2015
Formal sector	11,1%	13,1%	11,6%	12,8%	14,8%	–	22,0%	23,3%	24,6%	24,9%
Informal sector	88,9%	86,9%	88,4%	87,2%	85,2%	–	78,0%	76,7%	75,4%	75,1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	–	100.0%	100.0%	100.0%	100.0%

Source: ENAHO panel 2007-2011 and 2011-2015, INEI. Own elaboration.

Table 7
Distribution of employed persons by sectors of the economy and gender

	Panel 2007-2011					Panel 2011-2015				
	2007	2008	2009	2010	2011	2011	2012	2013	2014	2015
Men										
Formal sector	12,1%	13,7%	12,8%	14,9%	17,5%	–	26,8%	27,3%	28,2%	27,5%
Informal sector	87,9%	86,3%	87,2%	85,1%	82,5%	–	73,2%	72,7%	71,8%	72,5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	–	100.0%	100.0%	100.0%	100.0%
Women										
Formal sector	9,7%	12,2%	9,9%	9,7%	11,1%	–	18,7%	20,7%	23,0%	24,0%
Informal sector	90,3%	87,8%	90,1%	90,3%	88,9%	–	81,3%	79,3%	77,0%	76,0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	–	100.0%	100.0%	100.0%	100.0%

Source: ENAHO panel 2007-2011 and 2011-2015, INEI. Own elaboration.

Table 8
Sectors of the economy and the level of education

Level of education	Panel 2007-2011		Panel 2011-2015	
	Formal	Informal	Formal	Informal
Without education	0,1%	8,0%	0,9%	11,7%
Primary Education	7,5%	42,5%	12,2%	46,4%
High School	50,1%	37,5%	44,0%	33,1%
Superior Education	42,3%	12,0%	43,0%	8,8%
Total	100,0%	100,0%	100,0%	100,0%

Source: ENAHO panel 2007-2011 and 2011-2015, INEI. Own elaboration.

4.2. Initial advantage by subgroups

This section compares the average labor income for different groups of workers at the beginning of the analysis period, that is, for the year 2007. The objective of this procedure is to determine who, within each group, presented an initial advantage and estimate the magnitude of the differences compared to the other members of each subgroup. Seven groups are analyzed: by quintiles, by occupation category, by gender, by age group, by sector of the economy, by sector of activity and by geographical area. And for all cases, tests are made of the statistical significance of the difference between the average incomes of the subgroups, where the null hypothesis is that the averages of each sample are equal

From this section, the employed workers who do not receive remuneration (unpaid family workers) are excluded from the analysis since they would skew the analysis. In the same way, the analysis will focus on workers between 25 and 65 years. As pointed out by Fields and Sánchez Puerta[15] (2008), younger workers (14-24 years old) and older workers (older than 65 years old) are excluded to avoid interpreting fluctuations in the labor market (due to early work or retirements) as income mobility.

By quintiles

Table 9 shows the distribution of annual labor income by quintiles for the year 2007. By definition, individuals are ranked by income level. Therefore, the upper quintile (Q5) represents 20% of the sample with higher income. While quintile 1 (Q1), it represents 20% of the workers with the lowest incomes. The table shows the large differences in average annual income by quintile. It is appreciated that the workers belonging to the highest quintile earn on average twenty times more annual income than workers with lower incomes. If we compare the income of quintile 5 with the rest of the distribution, said subgroup presents an average annual income four times greater than the rest of the sample. As expected, the statistical test confirms the significance of the differences between the average incomes.

Table 9
Distribution of income by quintile for the year 2007

	Number of people	Percentage	Range	Average income
Q1	252	20%	(23,7; 1888,9)	1.069,28
Q2	252	20%	(1891,3; 3963,1)	2.955,16
Q3	252	20%	(3966,2; 6860,8)	5.386,26
Q4	252	20%	(6864,4; 11914,1)	9.112,39
Q5	252	20%	(11914,7; 142084,4)	21.623,93
Total	1260	100%	(23,4; 142084,4)	8.029,40

Source: ENAHO panel 2007-2011 and 2011-2015, INEI. Own elaboration.

15 Fields, Gary S., and María Laura Sánchez Puerta. "Earnings mobility in times of growth and decline: Argentina from 1996 to 2003." *World Development* 38, no. 6 (2010): 870-880.

By age groups

Table 10 shows the distribution of average earnings by age groups. Three groups are considered: the first, from 25 to 38 years; the second, from 39 to 52 years old; and the third, from 53 to 65 years. It can be seen that the average age group (39 to 52 years) is that he has the highest average income. This group presents about 30% higher income to the rest of the workers. The other two subgroups have average income with less difference. In this case, the null hypothesis is also rejected, that is, the statistical significance of the differences between the averages[16] as a whole is checked.

Table 10
Distribution of income by age groups for the year 2007

	Number of people	Percentage	Range	Average income
25-38	466	37,0%	(71,6; 101676,7)	7.540,95
39-52	538	42,7%	(23,4; 142084,4)	9.055,32
53-65	256	20,3%	(140,9; 80233,7)	6.762,53
Total	1260	100,0%	(23,4; 142084,4)	8.029,40

F-statistic = 5.98; Prob>F=0.0029 to a 95% of confidence.
Source: ENAHO panel 2007-2011 and 2011-2015, INEI. Own elaboration.

By level of education

Table 11 shows the distribution of average earnings by level of education[17]. It is clearly observed that as the level of education increases, the average income increases. In this way, the difference between the incomes of each group is around 70%. The group with higher education (more than 13 years of education), which has the highest income, shows an average income four times higher than the group without education and twice the average income of the rest of the workers. The statistical test shows that all these differences are significant.

Table 11
Distribution of average income by level of education

	Number of people	Percentage	Range	Average income
Without education	53	4,2%	(71,6; 13130,9)	3.045,58
Primary Education	455	36,1%	(46,8; 43790,8)	4.997,00
High School	484	38,4%	(214,2; 142084,4)	8.496,45
Collage	268	21,3%	(23,4; 57640,0)	13.319,83
Total	1260	100,0%	(23,4; 142084,4)	8.029,40

F-statistic =52.38; Prob.>F = 0.0000, to a 95% of confidence.
Source: ENAHO panel 2007-2011 and 2011-2015, INEI. Own elaboration.

16 However, by disaggregating the test in pairs, it is obtained that the difference between the sub groups of age 25-28 and 53-65 is not significantly different

17 The differences between the average income of the categories „without education“ and „primary education“ is relatively slight and not statistically significant.

By gender

Table 12 shows the distribution of average earnings by gender categories. It is appreciated that men are the ones who receive the highest income. Their average income is 46% higher than that of their female counterparts. The statistical test confirms that the difference between both categories is significant.

Table 12
Distribution of average income by gender

	Number of people	Percentage	Range	Average income
Men	748	59,4%	(285,8; 142084,4)	9.212,71
Women	512	40,6%	(23,4; 48190,1)	6.300,67
Total	1260	100%	(23,4; 142084,4)	8.029,40

T = 5.3033;Pr(T)>(t) = 0.0000, to a 95% of confidence.
Source: ENAHO panel 2007-2011 and 2011-2015, INEI. Own elaboration.

By sector of the economy

Table 13 shows the average income by sector of the economy. For this, a classification has been created that unites the categories of the economy sector (formal, informal) and the occupation categories (dependent and independent). In such a way that four categories are established: dependent formal, independent formal, informal dependent and informal independent. The results show that the category with the highest income is the independent formal category. The average income in this category is four times that of the formal dependent and almost five times that of the informal. Because only three individuals in the sample fall into this category, the results are unreliable. Thus, it is considered that formal dependent workers have an initial advantage because they earn more than the double compared to informal workers. The table also shows that the average incomes of dependent and independent informants are quite similar. The test confirms that the differences between the categories are statistically significant.[18]

Table 13
Distribution of average income by sector of the economy

	Number of people	Percentage	Range	Average income
Formal dependent	116	10,8%	(1532,9; 51989,2)	3.045,58
Formal independent	3	0,3%	(34773,4; 80233,7)	57.549,06
Informal dependent	187	17,4%	(84,3; 18941,2)	5.369,89
Informal independent	771	71,6%	(23,4; 142084,4)	6.349,14
Total	1077	100,0%	(23,4; 142084,4)	7.041,36

F-statistic =55.92; Prob.>F = 0.0000, to a 95% of confidence.
Source: ENAHO panel 2007-2011 and 2011-2015, INEI. Own elaboration.

18 When performing the peer test, the null hypothesis is accepted for the subgroups of informal workers. That is, it is found that the difference between the average income is not significant

By activity sector

Table 14 shows the distribution of average income by sector of activity. It is appreciated that the secondary and tertiary sectors have high average and similar incomes. The primary sector is the one with the lowest average income, around 50% lower than that of the other sectors. Although the test shows that the differences between the averages of the subgroups are statistically significant, the differences between the secondary and tertiary sectors are not.

Table 14
Distribution of average income by activity sector

	Number of people	Percentage	Range	Average income
Primary Sector	420	33,3%	(46,8; 46551,8)	4.854,33
Secondary Sector	99	7,9%	(124,2; 142084,4)	9.933,86
Tertiary Sector	741	58,5%	(23,4; 101676,7)	9.574,60
Total	1260	100,0%	(23,4; 142084,4)	8.029,40

F-statistic =35.86; Prob.>F = 0.0000, to a 95% of confidence
Source: ENAHO panel 2007-2011 and 2011-2015, INEI. Own elaboration.

By area

Table 15 shows that the average income in the urban area is double than of rural areas. The test confirms that the difference between the averages is statistically significant.

Table 15
Distribution of average income by area

	Number of people	Percentage	Range	Average income
Urban area	869	69,0%	(23,4; 142084,4)	9.546,27
Rural area	391	31,0%	(105,5; 46551,8)	4.658,17
Total	1260	100,0%	(23,4; 142084,4)	8.029,40

t = 8.5292;Pr)T)>(t) = 0.0000, to a 95% of confidence
Source: ENAHO panel 2007-2011 and 2011-2015, INEI. Own elaboration.

5. Measurement of mobility

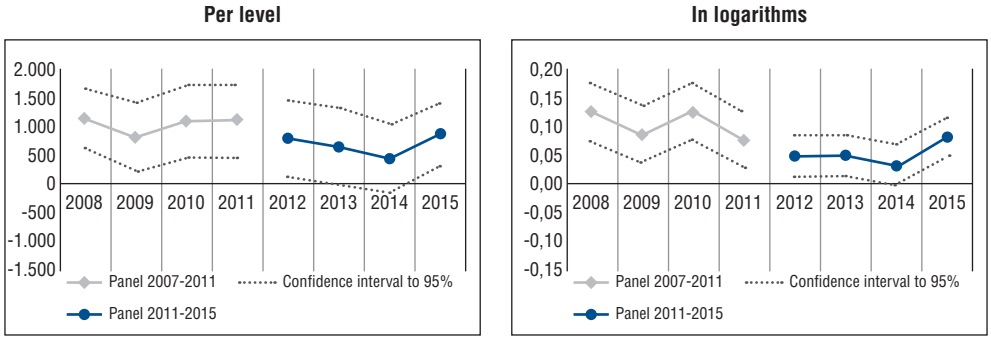
This section presents the analysis of the mobility of labor income based on the selected indicators: directional mobility and relative mobility[19]. First, aggregate mobility is calculated, for all workers as a whole, for the boom and post-boom periods. Then, mobility is measured by groups of workers.

19 The results of the Pearson correlation coefficient and the relative mobility index by group of workers are presented in Appendix 2

5.1 Added mobility

Below are the directional mobility index for the two panel samples. As mentioned above, mobility is calculated for labor income at levels (in monetary units) and in logarithms. The results are presented in graph 1. The graph shows that the average mobility during the boom period of raw materials remained positive, only presenting a slight contraction in 2009, year in which the effects of the international financial crisis affected the country. The mobility of average incomes in its logarithmic form reveals a strong contraction in mobility in 2011, the year in which the fall in commodity prices begins. It is observed that during the post-boom period the mobility was lower than during the previous period. In addition, there is a strong contraction in mobility in 2014, which can reach negative values. However, mobility grows again for 2015, although it remains below the levels of the boom period.

Graph 1
Aggregate average mobility by panel samples 2007-2011 and 2011-2015



Source: ENAHO panel 2007-2011 and 2011-2015, INEI. Own elaboration.

Table 16 presents the transition matrix by quintiles for the boom period (2002-2011) and post-boom period (2011-2015). As explained in the methodological section, the rows indicate the quintile of initial membership and the columns the quintile of final membership. The cells located on the diagonal show the percentage of workers who maintained the same relative position. And in the last two rows, the Pearson correlation coefficient between the initial and final labor income, and the independence index derived from that coefficient are presented.

The results show that there was mobility in both periods. People located in an intermediate position have the highest levels of mobility, while people in the extreme quintiles (1 and 5) have the lowest levels of mobility. That is, the poorest and richest workers tend to perpetuate themselves in their condition. The table reveals that approximately 60% and 59% of individuals change their relative position in the first and second periods, respectively. The small variation is due to immobility for the top quintiles (4 and 5) increases in the post-boom period. Although the relative mobility index shows moderate mobility in both periods, it is also observed that it decreased from 0.53 in the 2007-2011 period to 0.47 in the 2011-2015 period.

Table 16
Transition matrices 2007-2011 and 2011-2015

Initial position (2011)	Final position (2015)				
	Quintil 1	Quintil 2	Quintil 3	Quintil 4	Quintil 5
Quintil 1	47,96	26,96	17,55	6,27	1,25
Quintil 2	25,81	36,02	19,09	13,71	5,38
Quintil 3	14.29	25.91	29.30	23,00	7,51
Quintil 4	6,64	12,56	19,19	36,02	25,59
Quintil 5	2,46	6,04	12,08	23,04	56,38
Pearson Coefficient = 0.468					
Index of relative mobility = 0.468					

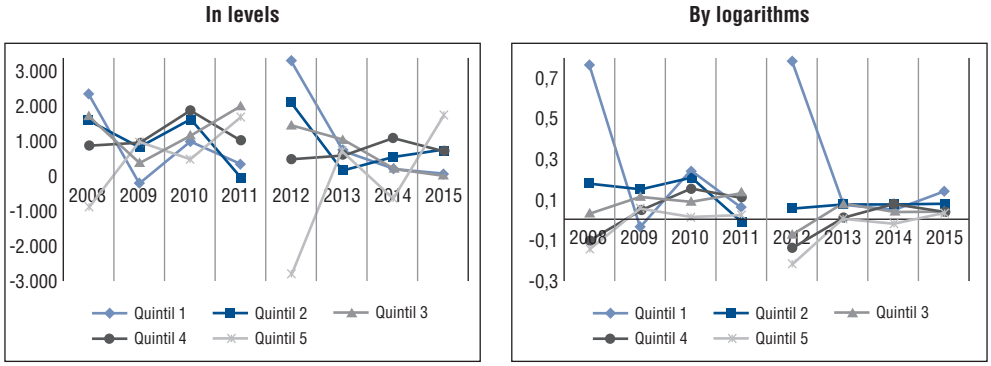
Initial position (2007)	Final position (2011)				
	Quintil 1	Quintil 2	Quintil 3	Quintil 4	Quintil 5
Quintil 1	49,42	26,74	16,86	4,65	2,33
Quintil 2	23,81	36,67	22,38	12,38	4,76
Quintil 3	14,08	19,90	29,61	22,82	13,59
Quintil 4	6,61	12,78	22,91	30,40	27,31
Quintil 5	2,59	3,88	7,33	31,03	55,17
Pearson Coefficient = 0.466					
Index of relative mobility = 0.534					

Source: ENAHO panel 2007-2011 and 2011-2015, INEI. Own elaboration.

5.2 Mobility by groups

Graph 2 shows the directional mobility by quintiles of the initial distribution. It is observed that at the beginning of the boom period the subgroup of the poorest experienced the highest levels of mobility, while the subgroup of the richest had negative levels of mobility. By the end of that period, based on the analysis of absolute and proportional changes, it is observed that the intermediate income subgroups (quintiles 3 and 4) presented the highest levels of mobility. The results for the period 2011-2015 are not so clear. However, it can be affirmed that the levels of mobility in this period are lower than in the previous period and seem to converge among the different quintiles.

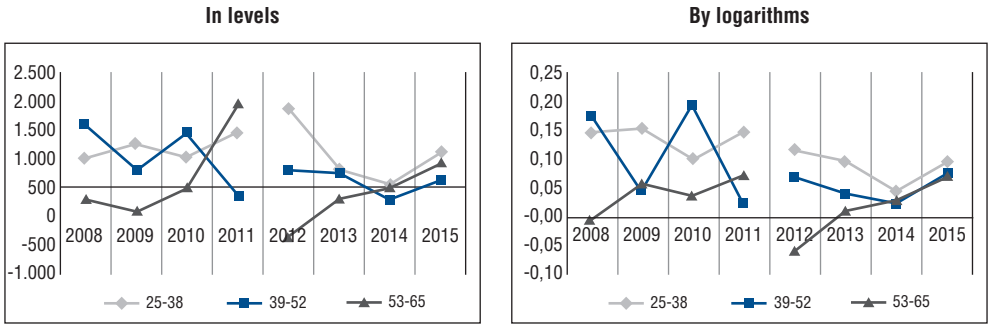
Graph 2
Average mobility by quintiles per panel samples 2007-2011 and 2011-2015



Source: ENAHO panel 2007-2011 and 2011-2015, INEI. Own elaboration.

Graph 3 shows directional mobility by age groups. It is appreciated that the group of 39 to 52 years, which had initial advantage, is the one with the lowest levels of mobility at the end of the boom and post-boom period. In general, it is observed that mobility levels are lower in the second period, and that the values tend to converge. Regarding relative mobility, the groups of 25 to 38 years and 53 to 65 years have a reduction in mobility between periods: from 0.65 to 0.53 and 0.47 to 0.26, respectively. While the group of 39 to 52 years increases its mobility from 0.47 to 0.54.

Graph 3
Average mobility by age groups by panel samples 2007-2011 and 2011-2015

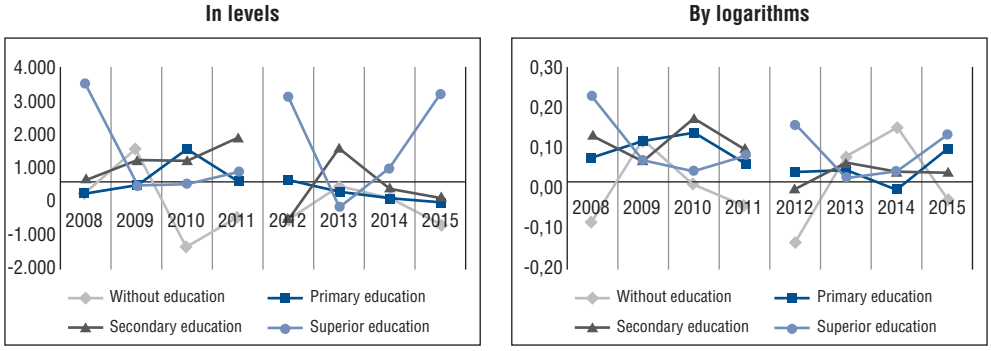


Source: ENAHO panel 2007-2011 and 2011-2015, INEI. Own elaboration.

Graph 4 shows mobility by levels of education. It is observed that in the boom period, both in the analysis by levels and by logarithms, the groups of higher, secondary and primary education experienced higher levels of mobility, while group without education had a more variable and even negative mobility in the 2011. In the post-boom period, it is observed that those who showed the greatest mobility were the most educated (higher

education), who also presented the initial advantage. Regarding mobility relative to initial income, the first three subgroups show an increase in their mobility. The higher education group shows a reduction in their relative mobility, from 0.54 to 0.34.

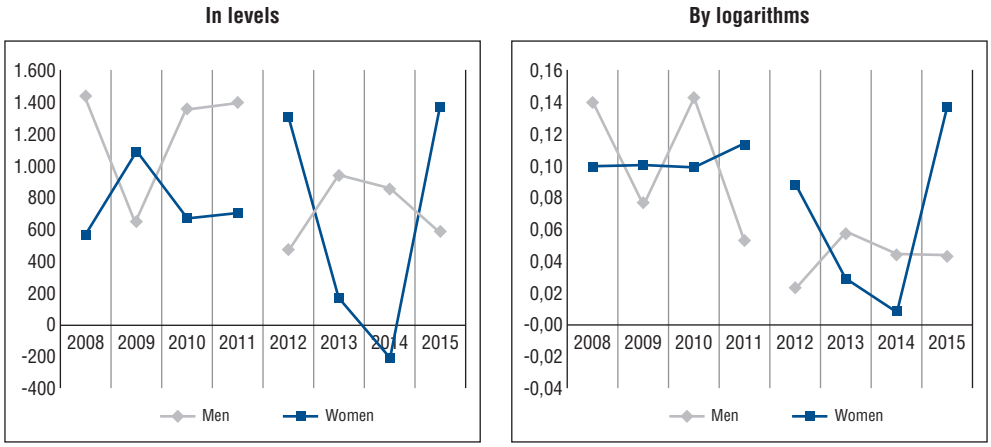
Graph 4
Average mobility by level of education per panel samples 2007-2011 and 2011-2015



Source: ENAHO panel 2007-2011 and 2011-2015, INEI. Own elaboration.

Regarding differences by gender, it can be seen in graph 5 that in the boom period both genders experienced positive mobility that although it was higher for men in an absolute way, in proportional terms the improvement in the case of women was greater. For the post-boom period there is a greater variability in income mobility of women, however, they are the most benefited in the second period. Regarding mobility relative to initial income, although mobility is greater for men, it is reduced for both sexes from one period to the next: from 0.55 to 0.50 for men and from 0.47 to 0.41 for women.

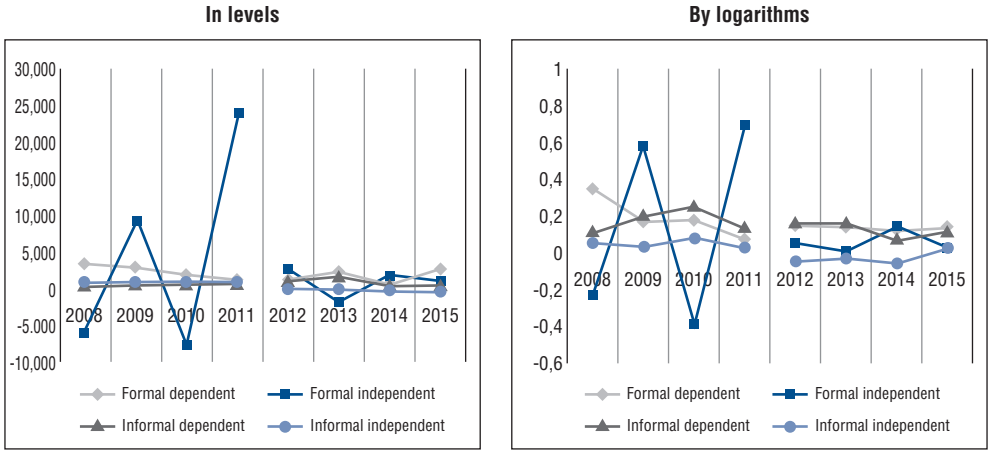
Graph 5
Average mobility by gender by panel samples 2007-2011 and 2011-2015



Source: ENAHO panel 2007-2011 and 2011-2015, INEI. Own elaboration.

Graph 6 presents the directional mobility by sector of the economy. It is observed that mobility for independent formal workers are the most volatile in the 2007-2011 period. As noted in the previous section, it is noted that the data for this category are not significant due to the low number of observations. The graph shows that during both periods, the dependent workers experienced greater mobility of their absolute income. While in the second period it is observed that the independent informal workers were the least benefited, since they experienced decreases in their income. In terms of mobility referring to initial income, this fell for the formal ones from 0.52 to 0.27. And it increased for all informal between the two periods: from 0.58 to 0.63 for the informal dependent and from 0.52 to 0.73 for the independent informal.

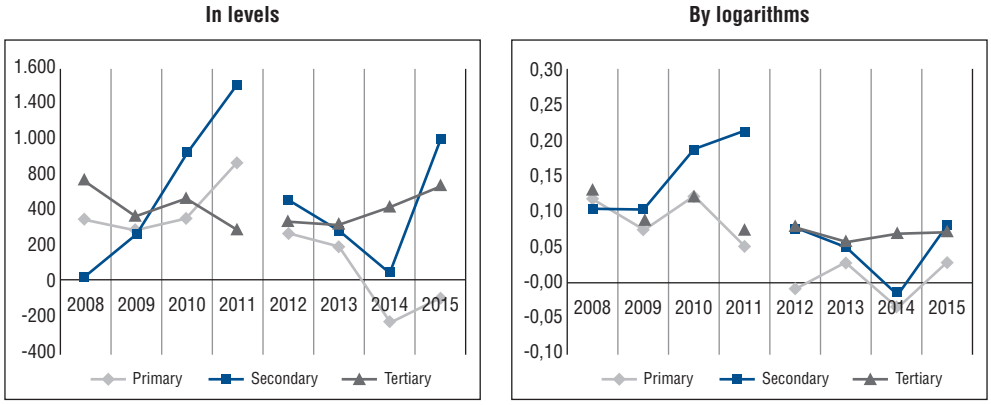
Graph 6
Average mobility by sector of the economy by panel samples 2007-2011 and 2011-2015



Source: ENAHO panel 2007-2011 and 2011-2015, INEI. Own elaboration.

Graph 7 shows the directional mobility by activity sector. The graph clearly shows that in the first period all the groups have high mobility, but only the secondary sector experiences an increase in their mobility. In the second period, only the tertiary sector presented high and constant mobility, while the other sectors experienced variability in their mobility. In terms of mobility relative to initial income, mobility was reduced for the primary sector from 0.43 to 0.24 and for the tertiary sector from 0.58 to 0.56. While it increased for the secondary sector from 0.17 to 0.28.

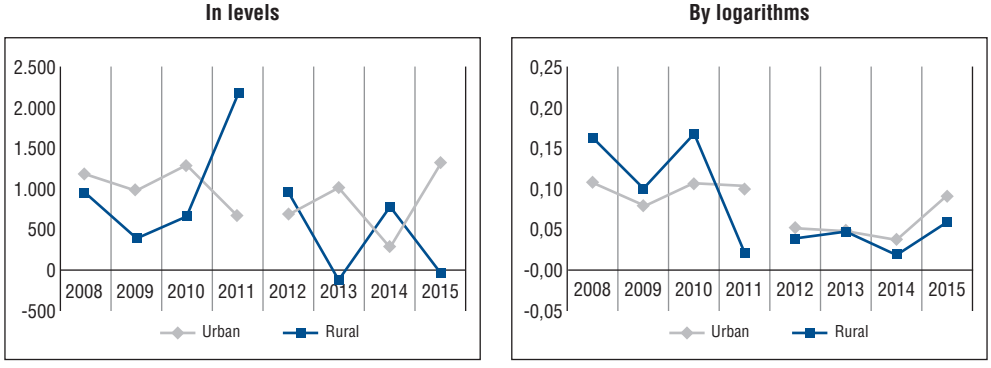
Graph 7
Average mobility by sector of activity by panel samples 2007-2011 and 2011-2015



Source: ENAHO panel 2007-2011 and 2011-2015, INEI. Own elaboration.

Graph 8 shows the directional mobility by area. In the first period, mobility levels are higher than in the second period. In the boom period, it seems to have been more favorable for the rural area, while the post-boom period was more favorable for the urban area. Regarding the mobility relative to the initial income, this decreased for the urban area from 0.49 to 0.46 and increased for the rural area 0.48 to 0.67.

Graph 8
Average mobility by area by panel samples 2007-2011 and 2011-2015



Source: ENAHO panel 2007-2011 and 2011-2015, INEI. Own elaboration.

6. Conclusions

This article contributes to the study of economic transformations during the boom (2007-2011) and post-boom (2011-2015) in terms of the mobility of labor income. The questions

that guided the investigation were: what socio-economic transformations in terms of mobility occurred during the boom period? And, were these sustainable transformations reversed during the post-boom period? To answer these questions, the analysis used longitudinal data bases to estimate mobility indexes in absolute and relative terms. The analysis was carried out in two steps.

In the first step, the magnitude and direction of the mobility of labor income was measured, based on the index of directional mobility, for the boom and post-boom periods. It was found that the level of mobility in the boom period was greater than that of the post-boom. Although mobility was on average positive, it presented negative signs in the years 2009, 2011 and 2014, coinciding with years of economic contraction. In terms of relative mobility, the index of independence of initial income shows moderate mobility, but it is reduced from 2007-2011 to 2011-2015.

In the second step, the mobility of labor income by groups of workers was measured. It was previously identified which groups of workers had the highest average labor income. That is, who had an initial advantage compared to the rest of the workers? The groups with the highest initial income were: workers in the highest quintile of the income distribution, workers between 39 and 52 years of age, workers with higher education (who have at least 13 years of education), male workers, dependent formal workers and workers in the urban area. In the case of workers by sector of activity, it was found that the most disadvantaged group was that of the primary sector.

The analysis of directional mobility by groups of workers shows that during the period of the boom, those individuals who did not have an initial advantage, that is, those with lower average earnings, were in many cases, those who presented higher levels of mobility compared to its counterparts This was the case of the workers belonging to the first quintile of the distribution (the poorest), to the women in the rural area. While during the post-boom period, many workers with initial advantage were the ones who benefited the most. These were the workers with higher education, formal dependent workers and those from the urban area. The group independence index reinforces these results. This index is precisely reduced for those advantaged workers in the case of: workers with higher education, male workers, formal dependent workers, workers in the secondary sector and the urban area.

Taken together, these results suggest that during the boom period, the economic transformations were positive translated into the possibility of achieving higher labor incomes. And that during the post-boom, this capacity was lost. These results are interpreted as convergence processes during the first period, which, although not fully reversed in the post-boom period, lost intensity.

What factors can explain the increase and subsequent stagnation of income mobility? Two relevant factors can be identified: minimum wage policies and the growth model based on the export of raw materials.

On the one hand, mobility is positively affected by increases in the minimum wage that occurred during the period under analysis. It is expected that an increase in the minimum wage will benefit lower-income workers and have a stimulating effect on the economy by boosting domestic demand. However, the evolution of mobility cannot be attributed exclusively to this labor policy, since there were increases in the minimum wage both in the boom period (2007, 2008, and 2010) and the post-boom period (2011 and 2012) and

these were of similar magnitudes. In addition, given the high level of informality in the labor market, the rates of coverage and compliance with the minimum wage are low, so its effect does not tend to be significant.

On the other hand, both the stagnation of income mobility and the loss of intensity in the convergence of these are a consequence of the growth model based on the export of raw materials. The increase in commodity prices at the beginning of the 2000s, generated a greater dependence on exports of raw materials. In this context, there were no changes in the productive structure of the country. That is to say, the impact of the commodity boom on the labor market occurred through the creation of indirect jobs generated by the mining and hydrocarbon sectors. Indirect jobs were created mainly in the service sector, where the creation and destruction of employment is frequent and rapid, due to low barriers to entry and exit, and where employment tends to be of low productivity and precarious conditions. Then, during the expansionary period, the creation of employment in the services sector was the main force that promoted upward mobility for those workers who tend to be the least favored, with the lowest incomes, which in turn led to the tendency to the convergence of labor income. Subsequently, in the post-boom period, the economy slows down and loses dynamism, consequently the level of mobility is lower. And in this context, the most productive workers (the most educated, the formal, and the urban) benefit the most, so that the convergence of labor income loses intensity.

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Annex 1
Number of individuals per sample panel

Number of people	Panel sample 2007-2011				Panel sample 2011-2015			
	Wave 1-2	Wave 1-2-3	Wave 1-2-3-4	Wave 1-2-3-4-5	Wave 1-2	Wave 1-2-3	Wave 1-2-3-4	Wave 1-2-3-4-5
Number of people old enough to work	17456	10979	6257	2618	20706	11543	5745	4942

Source: ENAHO panel 2007-2011 and 2011-2015, INEI. Own elaboration.

Annex 2
Relative mobility: Pearson correlation coefficient and relative mobility index for the period 2007-2011 and 2011-2015

	Pearson correlation coefficient		Index of relative mobility	
	2007-2011	2011-2015	2007-2011	2011-2015
Groups by age				
From 25 to 38 years old	0.3437	0.4723	0.6563	0.5277
From 39 to 52 years old	0.5299	0.4523	0.4701	0.5477
From 53 to 65 years old	0.5252	0.7347	0.4748	0.2653
By educational level				
With no education	0.5507	0.4256	0.4493	0.5744
Primary	0.4499	0.3190	0.5501	0.6810
High School	0.4212	0.3861	0.5788	0.6139
Superior Education	0.4546	0.6529	0.5454	0.3471
By gender				
Men	0.4474	0.4993	0.5526	0.5007
Women	0.5221	0.5885	0.4779	0.4115
By sector of economy				
Formal dependent	0.4767	0.7203	0.5233	0.2797
Formal independent*	-0.4658	0.4439	1.4658	0.5561
Informal dependent	0.4187	0.3621	0.5813	0.6379
Informal independent	0.4789	0.2694	0.5211	0.7306
Sector of activity				
Primary	0.5677	0.7535	0.4323	0.2465
Secondary	0.8254	0.7142	0.1746	0.2858
Tertiary	0.4182	0.4315	0.5818	0.5685
By area				
Urban	0.5036	0.5319	0.4964	0.4681
Rural	0.5129	0.329	0.4871	0.6710

Only the results for the independent informal category in the 2007-2011 period are not significant.
Source: ENAHO Panel 2007-2011 and 2011-2015 INEI. Own elaboration.

Economic growth, inequality and poverty in Bolivia

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Universidad Mayor de San Andrés

1. Introduction

The Bolivian economy after the worst crisis that it had to live in peace between the late seventies and mid-eighties, which transcended the economic sphere, dramatically affecting the country's political and social life, resumed the path of growth, although with the restrictions imposed by the crisis of the world economy between 1997 and 1998, and later, between 2007 and 2008.

The most representative growth rates began to register since 2003, in an international environment that became enormously favorable for the national economic activity and that lasted until 2012, having registered in this period an annual growth rate of 4.2%, higher than 1.1 pp. than the annual average observed in the previous period 1993-2002. In terms of GDP per capita, this meant an increase from an annual average of 1.1% to 2.6%, between both periods.

On the other hand, in this period the progress made by Bolivia in the reduction of poverty was notable, both in the urban and rural areas, although with greater intensity in the first area. This allowed Bolivia to leave the situation of the country with the greatest extreme poverty in the region in 2005, placing itself after ten years, in 2014, in the penultimate place, in a context in which in these same years all the countries of the Latin American region significantly reduced their poverty levels[2]. Likewise, important progress was made in reducing the inequality of income distribution, particularly between 2005 and 2011, when the Gini coefficient lowered from 0,59 to 0,47.

1 This article is an adaptation of chapter 4 of the doctoral thesis, Determinants of Economic Growth, Poverty and Inequality in Bolivia, Universidad Mayor de San Andrés, La Paz, Bolivia, November 2017.

2 However, the downward trend observed in the last decade has not been without difficulties in recent years. Thus, according to CEPAL (2014) in 2013, poverty remained at levels similar to those registered in 2011 and 2012, showing stagnation, while extreme poverty increased, albeit incipiently.

According to the literature there is a positive correlation between growth and the quality of life of the inhabitants, especially in developing countries. In this sense, it is expected that the highest growth registered in the Bolivian economy, since the beginning of the decade of the two thousand until 2013, has contributed to an improvement in the quality of life of the population and the reduction of poverty. However, the evidence available at national level is limited. On the other hand, the issue of quality of life is multidimensional, and therefore, quite complex, to which is added the fact that Bolivia is characterized by an important heterogeneity of development and income throughout its territory. Therefore, the objective of this chapter is to explore the relationship between growth, poverty and income distribution, from the national, urban - rural and regional perspectives, through the use of the micro simulation technique with information from the Homes Survey of the National Institute of Statistics.

Apart from this introductory section, this work is organized as follows. Section 2 examines the empirical background of the relationship between economic growth, poverty and inequality in the distribution of income; Section 3 briefly discusses the profile of poverty in Bolivia; Section 4 presents the theoretical-conceptual analytical framework of the research; in section 5 the methodology used is described; Section 6 presents and analyzes the empirical results; and in section 7 it is concluded

2. Background

Bolivia, considered by UN as a developing country, it has a population of 10.03 million inhabitants, according to the 2012 Population and Housing Census, of which 67.3% is urban and the remaining 32.7% rural. In comparison with the 2001 Census, the urban population increased by 586 thousand inhabitants, representing an increase of 4.9%, the result of an annual growth of 2.4%, considerably higher than the rate of 0.5% of the population from rural area. The growth of the urban population is mainly due to the process of urbanization, as a result of the migration of the population from the countryside to the city, in search of better living conditions.

On the other hand, Bolivia is a country characterized by great socio-economic and geographic disparities, a situation that is in a certain way is summarized in the high levels of inequality of the income distribution measured by the Gini[3] coefficient, which for 2014 was calculated by the World Bank at 0.47, despite the fact that this indicator fell sharply since 2005 when it registered 0.60 (Bancomundial.org, 2016).

3 This indicator of inequality was introduced by Corrado Gini in 1912, although his fame reached only in 1921, when it was published in the Economic Journal. This index is calculated as the area between the Lorenz curve and the 45 ° line and the area below this line, obtaining a proportion. This coefficient takes values in the interval [0,1]; when it takes the value 0, the Lorenz curve overlaps the 45 ° line and corresponds to the totally equal distribution; at the other extreme, when it assumes the value 1, the Lorenza curve runs along the sides of the box and corresponds to the case in which all income is concentrated in a single person (Gasparini, Cicowiez and Sosa, 2011, p.30).

In part, this inequality in the distribution of income would be influenced by the social structures of the population that are different in terms, for example, levels of education and labor markets with predominance of informality, consequently, low productivity or simply subsistence . On the other hand, the integrated development of the country is also limited, for example, by the limitations in transport infrastructure and the lack of access to the ocean.

With regard to economic activity, in the period 1992-2002, it expanded at an average annual rate of 3.3%, partly explained by the severe crisis in the world economy that took place in the late 1990s which was transmitted to the national economy through the foreign trade channel, causing a drop in the growth rate from 5.03% in 1998 to 0.43% in 1999. Afterwards, from 2003 to 2013, a period that approximately corresponds to the expansionary phase of the world economic cycle, the product registered an annual growth of 4.7%,[4] also affected by the financial crisis-global economic crisis occurred between 2007 and 2009, reducing growth between 2008 and 2009 from 6.15% to 3.36%.

In terms of GDP per capita, it went from an average annual rate of 1.1% to 3% in the periods 1992-2002 and 2003-2013[5], respectively. In this way, in general, the greater economic growth seems to have been beneficial for the Bolivian population, observing a significant progress in the standard of living, since according to the empirical evidence, the quality of life of the population is positively correlated with the product per capita, especially in poor countries.

On the other hand, the important growth of the economy would have favored more the sectors of the population in poverty condition, since this one was reduced vertiginously during the last ten years. Thus, extreme poverty decreased from 38.2% in 2005 to 17.3% in 2014, while moderate poverty decreased from 60.6% to 39.3%, between the same years (Economic and Social Development Plan, page 65). However, it should be noted that poverty, both extreme and moderate, in rural areas continues to be the highest one.

3. Profile of poverty in Bolivia

In the context of the Latin American region, in 2005 Bolivia was the country with the highest percentage of extreme poverty[6], with 38% of the population living in conditions

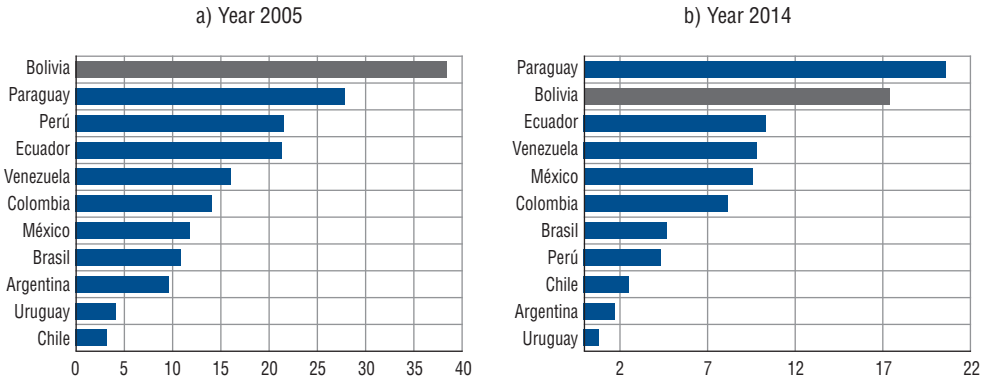
4 Considering the period 2006-2014, which corresponds to the validity of the Economic, Social, Community and Productive Model of the current government, the annual growth rate of the economy was 5.1%, (Bancomundial.org, 2016; Economic and Social Development Plan (PDES) 2016-20120, p.48).

5 When the 1996-2005 and 2006-2014 periods are considered, the average annual growth rates were 1.2% and 3.3%, respectively.

6 "Absolute poverty is a condition characterized by severe deprivation of basic human needs, such as food, drinking water, sanitation facilities, health, housing, education and information. It depends not only on income, but also on access to social services. "(Un.org, 2016, chapter II, p.19). On the other hand, the progress in the reduction of extreme poverty in Bolivia between 1996 and 2005 was meager, since in the first year this represented 41.2% of the total population, and even in the year 2000 an increase was observed overcoming the 45%, to subsequently return to the previous trend of a languid decrease.

of severe deprivation of basic human needs, followed by Paraguay with 28% and Peru with 21 %. In that same year, the country with the lowest extreme poverty was Chile with only 3% of the population, followed by Uruguay with 4% (Graph 1.a). On the other hand, in rural Bolivia, in 2005, 63% of the population was in extreme poverty compared to 24% in the urban area.

Graph 1
Extreme poverty in selected countries
(In percentage)



Source: Prepared by the author with data from ECLAC.
Note: For Bolivia, the data correspond to National Institute of Statistics INE and UDAPE.

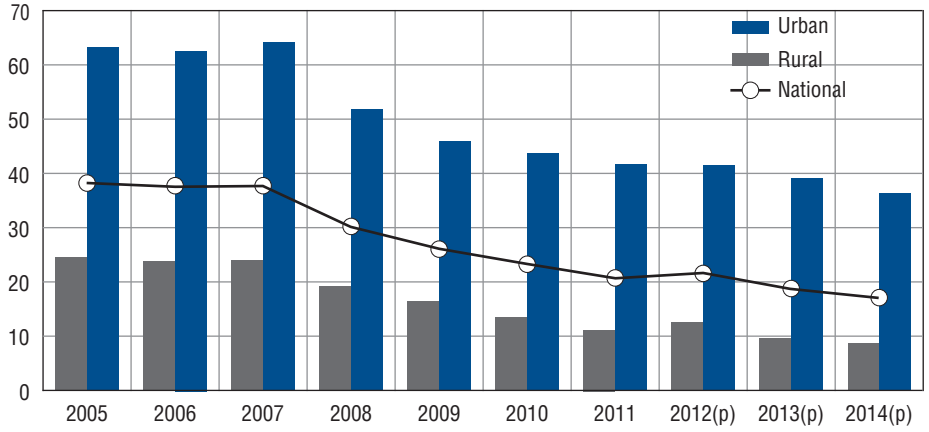
In the following years, as a result of solid growth and the implementation of a set of social policies, including conditional cash transfers (Bono Juancito Pinto, Renta Dignidad and Bono Juana Azurduy), [7] an accelerated reduction of extreme poverty began to be observed, particularly since 2008, reaching 17.3% in 2014 (Graph 2), which made it possible to reach by 2015 the millennium goal of reducing extreme poverty by half, that is, to 24.1% between 1990 and 2015 (UDAPE, 2016). This result allowed Bolivia in 2014 to be in the penultimate place, leaving the last position to Paraguay (Figure 1.b). However, despite these achievements, extreme poverty remains high, particularly

7 The objective of the Juancito Pinto Bono is to motivate educational permanence and contribute to the reduction of the school dropout rate and consists of the single payment per year of Bs200 to the students of fiscal education units and education of an agreement. For its part, the purpose of Renta Dignidad is to improve the quality of life of adults over 60 years of age without any exclusion. The non-rentiers receive the sum of Bs250 monthly and the Bs200 rentiers. As for the Juana Azurduy Bonus, its objective is to improve the health and nutrition of mothers, girls and boys, and contribute to the reduction of the maternal-infant mortality rate. The bonus consists of the payment of Bs1,820, granted to expectant mothers and children up to two years of age. According to the Ministry of Economy and Public Finance, as of May 2016, the population that benefits from conditional direct transfers amounts to 45.4% of the total population, 19.9% corresponding to the Juancito Pinto Bond, 11.0% to Renta Dignidad and 14.5% to the Bonus Juana Azurduy

in rural areas (Graph 2). Thus, in 2014 the latter represented more than 36%, higher by almost 28 pp. to extreme poverty in the urban area and above 19 pp. to extreme national poverty.

In this way, in addition to the fact that the extreme poverty which afflicts the Bolivian population is one of the highest in the region, it affects the rural population more severely, so that the fight against this tragic social situation must be one of the priority objectives of public policies.

Graph 2
Bolivia: extreme poverty
(In percentage)



Source: Own elaboration with UDAPE data.
Note: (p) preliminary.

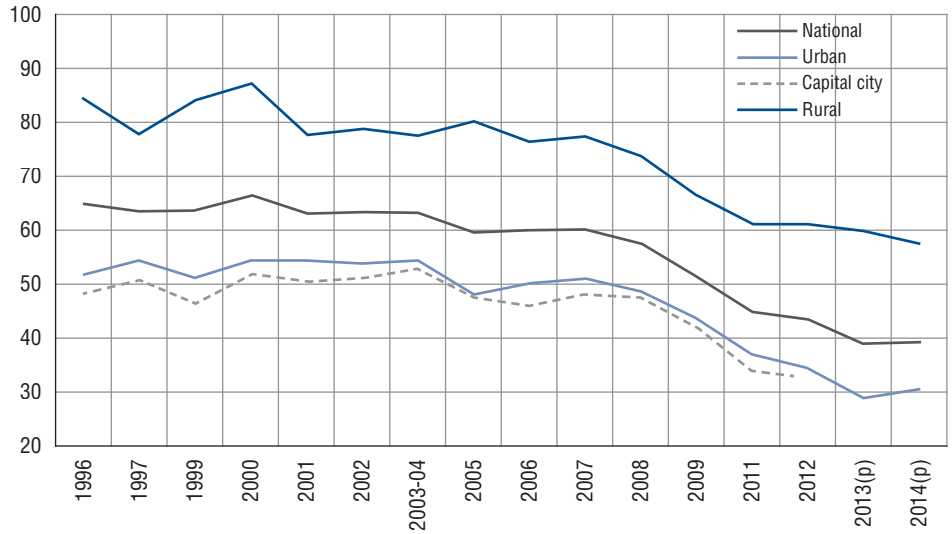
With regard to moderate poverty, between 1996 and 2007, progress has not been very significant. In effect, in this period the poverty index at the national level remained stagnant around the average, systematically ranking above it until 2004, reaching in 2007 it represented 62.7%. This mediocre situation was due to the stagnation of the reduction of poverty in the urban area since poverty in the rural area was decreasing, although in an unrepresentative manner (Graph 3), recording an accumulated reduction of 7.1 pp in the period.

The history is completely opposite between 2008 and 2014, since poverty at national level fell sharply to reach 39.3% in 2014, having seen the greatest advances between 2001 and 2012, although in the last two years the trend is towards relative stagnation, possibly influenced by the deceleration of national economic activity as a result of the deterioration of the world economy. In any case, this result was a reflection of the progress made in reducing poverty in both urban, [8] and rural areas. However, it is noted that despite these

8 The reduction of poverty in the urban area is basically a reflection of the results in the capital cities, including the city of El Alto (Graph 3).

improvements, poverty in the rural area continues to be high, which in 2014 was equivalent to almost twice the urban level (Graph 3).

Graph 3
Bolivia: moderate poverty
(In percentage)



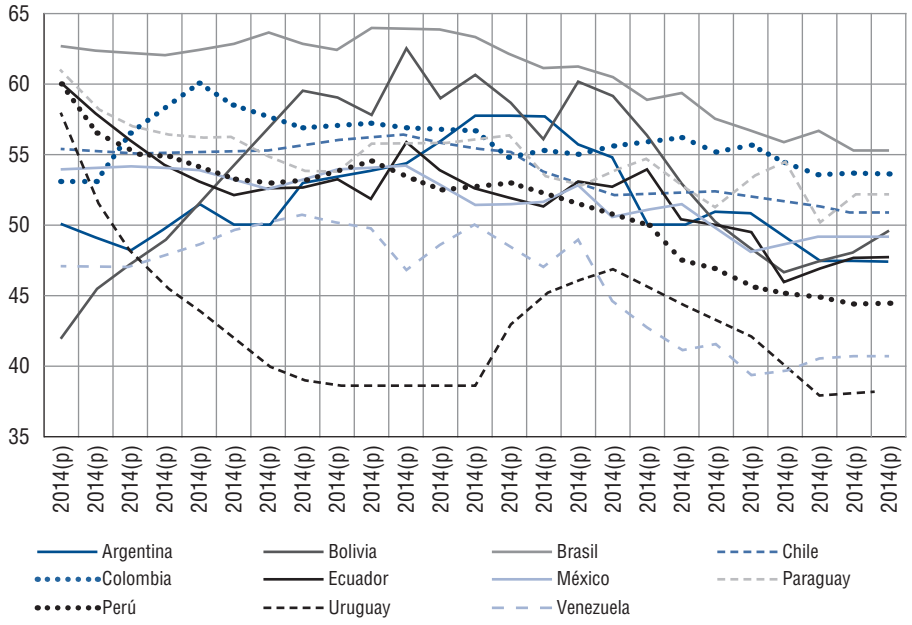
Source: Own elaboration with UDAPE data.
Note: (p): Preliminary.

3.1 Profile of income distribution in Bolivia

Advances in economic growth in the period 1990-2014 were accompanied by the inequality of income distribution, measured by the Gini coefficient. Indeed, during the period 1990-1997, characterized by the second generation reforms, among which the implementation of the capitalization process of the main public companies stands out, economic growth did not translate into reductions in the inequality of the income distribution, but, on the contrary, it expanded disproportionately, having increased the Gini coefficient from 0.42 in 1990 to 0.60 in 1997. In the following years until the middle of the 2000s, several crises of the world economy were recorded and transmitted to the economy growth rate, so that the inequality in the distribution of income remained at the level recorded in 1997. It was from 2006 to 2012 that the international context became enormously favorable for developing economies, facilitating, among other things, the creation of employment, the improvement of labor income and the execution of a conditioned transfer policy, which in the Bolivian case manifested itself in a significant reduction in the inequality of the income distribution, with the Gini coefficient in 2011 reaching the historical minimum of 0.47. However, with the recent deterioration of the international economic scenario, progress in the equity of the income distribution shows a tendency to a slight reversion (Graph 4).

On the other hand, it should be noted that in 2005 Bolivia became one of the most inequitable countries[9] in the region, only surpassed by Brazil, which historically is one of the countries with the greatest inequality of income distribution in Latin America. After seven years, in 2011, the distribution of income improved significantly, placing Bolivia below six countries, among them Mexico, Argentina, Chile and Paraguay (Graph 4). However, despite this, according to the Latinobarómetro[10] 2013 survey, Bolivia is a hybrid case with growth above the Latin American average, but more than a case of economic redistribution, it is going through a "strong process of redistribution of quotas of power or participation of citizens, a process of social, political and economic inclusion "(p.79).

Graph 4
Evolution of the gini in selected countries



Source: Own elaboration with data from the World Bank and UDAPE for the case of Bolivia.

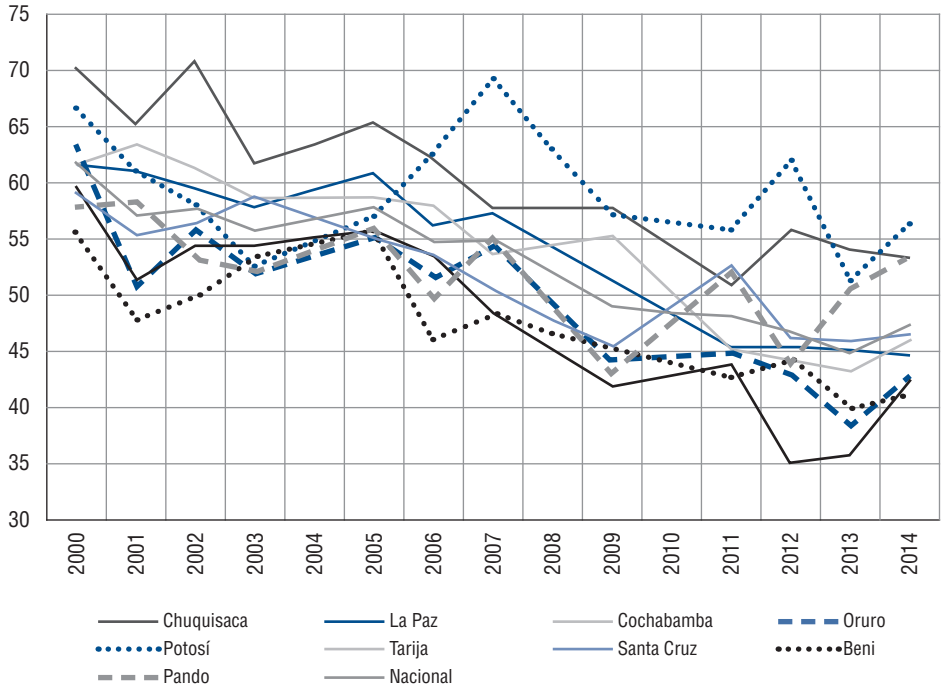
When examining income inequality at the regional level, it can be seen that the departments that have registered an important improvement are: Tarija, where Gini

9 Episcopal Commission of Social Pastoral Caritas-Bolivia, this situation is not only due to the concentration of wealth in the hands of few rich, but, mainly, to the low participation of the poor in total income. "Thus, in 2002, out of every hundred bolivianos of income distributed, the poorest 10% of the population received only 17 cents, while the richest 10% received 46 bolivianos" (p.1).

10 The Latinobarómetro is a regional opinion survey project, based in Chile.

decreased from 0.56 in 2005 to 0.42 in 2014, Oruro from 0.55 to 0.43 and Beni from 0.56 to 0.41. On the other hand, those that maintained inequality in income distribution or even increased, were Potosí and Chuquisaca, and Pando as of 2011. In the remaining departments, which belong to the central axis, La Paz, Cochabamba and Santa Cruz, throughout the period under review, inequality has evolved around the national average (Graph 5). However, despite these divergences, in recent years practically in all departments there has been a change in the trend towards a partial reversal of these achievements, with slight increases in the inequality of the income distribution.

Graph 5
Evolution of the gini according to department



Source: Own elaboration with data from the Household Survey.

4. Analytical framework

This section briefly reviews the conceptual framework, emphasizing the theoretical aspects related to the relationship between economic growth and poverty reduction and the influence that the distribution of income may have on this relationship. Later, in order to show empirical evidence on the relationship between economic growth and changes in the socio-economic situation of the population, a review is made of the most relevant studies that have been conducted for the Bolivian case.

4.1. Conceptual framework

According to the literature, economic growth is closely related to the reduction of poverty, especially in the long term, but, on average, also in the short term. Thus, Kraay (2006) for a sample of 285 surveys in 80 countries finds that in the short or medium term the distributional changes play an important role, but in the long term the growth of average income is the most important factor to explain the changes in poverty. For their part, Kinkovskiy and Sala-i-Martin (2010) also conclude that the dominant factor that explains the evolution of poverty rates is growth. And, according to Ravallion (2003) the incidence (and depth) of absolute poverty in developing countries tends to fall with growth.

The reduction of inequality reduces the level of poverty, given a distribution of income, but, in addition, implies a higher elasticity-growth of poverty, with which the impact on the efficiency of growth becomes more lasting. However, in practice the different ways of reducing inequality can have different effects on growth, encouraging under certain circumstances and making others difficult.

The distribution of income has an important influence on economic growth, being able to limit or favor it. Its negative effect was studied by numerous authors. Thus, Todaro (1977) analyzes the different channels through which inequality in the distribution of income in developing countries can hinder sustained growth. On the other hand, Barro (1999) considers that the high levels of socio-economic inequality in poor countries can delay growth. A calculation on the positive relationship between growth, poverty reduction and income distribution was made by the UN (2005) which states: "It is estimated that the regional growth rate projected to reach the goal of extreme poverty could be reduced approximately 0, 2 percentage points for each percentage point of reduction in the Gini coefficient. In this way, with a 5% reduction in this indicator, which translates into increases in the income share of the first quintile of households around 0.35 percentage points, the regional product per capita should grow by 2.1 % annual, instead of 2.9% ... "(p.56). Thus, it is postulated that a better distribution of income allows reaching the goals of poverty reduction in a shorter term. However, the relationship between growth and inequality does not seem to be univocal, but rather bi-directional, since distribution can also affect growth, depending on the level of development of a country.

In relation to these issues, the empirical evidence suggests that the relationship between growth and inequality of income distribution is weak. A result of this type was found by Deininger and Squire (1996). Similarly, Dollar and Kraay (2002) found in a sample of 92 countries that the income of the lowest quintile of the population does not systematically vary with average income, a result that is strong at the regional, temporal, income levels and economic growth rates.

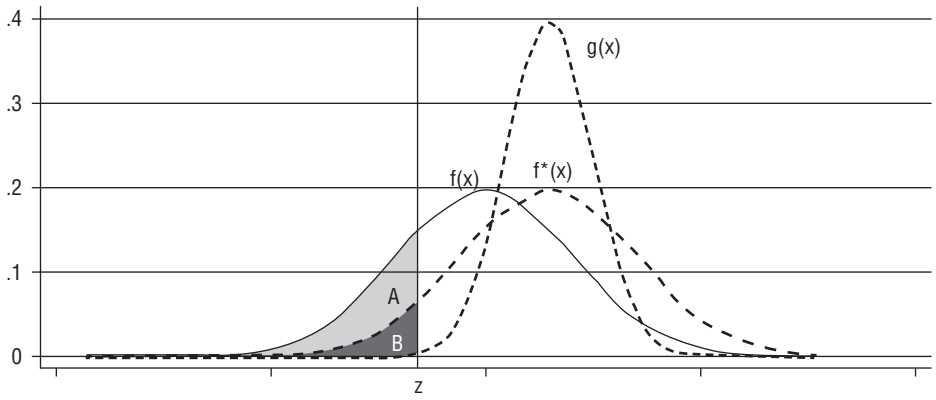
However, according to the French economist François Bourguignon (2004), the reduction of poverty in a given country and at a given time is totally determined by the growth rate of the average income of the population and the change in the distribution of income; the three elements are closely linked, influencing one another.

In any case, changes in poverty depend on the increase in average income, the initial level of inequality and changes in inequality (Dollar and Kraay, 2002, Ravallion, 2003, 2004, World Bank, 2000, 2006, Klasen, 2005).

4.2. Decomposition of changes in poverty: growth effect and distribution effect[11]

Any distributive change can be broken down into a growth effect and a redistribution effect. The growth effect is reflected in a change in the position of the income distribution, while the effect of redistribution changes the form of the distribution. Thus, Graph 6 illustrates these changes: when the distribution shifts from f (x) to g (x), the mass below the z line falls, thus reducing poverty. You can decompose the step from f to g in two steps. The first assumes a proportional increase of all incomes, with f moving to f *, where the latter represents a counterfactual distribution similar to f, but with the average income of g. The step of f to f * is the growth effect and its impact on the poverty rate is area A. The second step of the decomposition, between f * and g, captures the impact of the change in the form of the distribution with the mean without modification that in the graph is represented by area B, known as redistribution effect. The result of the decomposition depends on the order in which the disaggregation is carried out: similar to f, but with the average income of g. The step of f to f * is the growth effect and its impact on the poverty rate is area A. The second step of the decomposition, between f * and g, captures the impact of the change in the form of the distribution with the mean without modification that in the graph is represented by area B, known as redistribution effect. The result of the decomposition depends on the order in which the disaggregation[12] is carried out.

Graph 6
Decomposition of change in poverty



Source: Taken by Gasparini, Cicowiez and Sosa-Escudero (2011, page 521).
Notes: Area A: growth effect.
Area B: redistribution effect.

11 This section is based on Gasparini, Cicoweiz and Sosa-Escudero (2011, pp. 521-524).
12 An alternative is to initially move from f to a counterfactual distribution with the form of g, but maintaining the average in its value of (redistribution effect) and then moving from this distribution to g (growth effect).

One way to implement the decomposition of the poverty index is by the method proposed by Datt and Ravallion (1992). The procedure consists in the decomposition of poverty rates into three components: i) component associated with growth that measures the reduction of poverty that would have been observed if there were no distributional changes, ii) component associated with the change in inequality measured by the variation that would have registered poverty if no growth was registered, and iii) waste, which includes the interactions between growth and inequality, whose interpretation, according to these authors, is not clear.

As a way of illustration, suppose that poverty in a given period (P_t) is a function that depends on the average expenditure (μ_t), the poverty line (z) and the parameter vector that completely defines the Lorenz curve (L_t). Formally,

$$P_t = P(z|\mu_t, L_t) \tag{1}$$

According to this methodology, the variation of poverty between the period τ and τ + s can be broken down as follows:

$$P_{\tau+s} - P_\tau = G(\tau, \tau+s; r) + D(\tau, \tau+s; r) + R(\tau, \tau+s; r) \tag{2}$$

where G denotes the reduction of poverty associated with growth (change in average spending), D the variation of poverty related to changes in inequality and R the residue. In the decomposition it must be taken as reference a date, r, with respect to which the change in the average expenditure and in the inequality is calculated. According to Datt and Ravallion (1992) the natural choice is the first year, τ.

The G (•) component is defined as follows

$$G(\tau, \tau+s; r) = P(z|\mu_{\tau+s}, L_r) - P(z|\mu_\tau, L_\tau) \tag{3}$$

and corresponds to the change in poverty if only the average expenditure changes, given the inequality of the reference period (r).

As for component D (•), this is expressed as

$$D(\tau, \tau+s; r) = P(z|\mu_r, L_{\tau+s}) - P(z|\mu_r, L_\tau) \tag{4}$$

This expression indicates that the change in poverty, when the average expenditure for the reference period is maintained, and there is a change in the distribution of expenditure. To parameterize the Lorenz curve, the beta distribution is used.

4.3. Review of the empirical literature

In the Bolivian case, there are a number of studies on income distribution that deal with different aspects, including Yáñez (2004), Landa (2004), Jiménez and Lizárraga (2004) and Velásquez (2007). However, the works dedicated to exploring the effect of growth on the reduction of poverty and inequality in the distribution of income. are limited. In the works that are briefly discussed below, the effect of greater growth

on the reduction of poverty is dissimilar, but the relationship between both variables cannot be denied.

Landa (2004), using different measures of pro-poor growth such as the Growth Incidence Curve (Ravallion and Chen, 2003), Poverty Equivalent Growth Rate (Kakwani and Son, 2002) and Poverty Growth Curve (Son , 2003), applied to data from the Household Survey of the years 1998 and 2002, finds that in that period there was no pro-poor growth due to the decrease in the average real income of households and the reduction of labor income, This situation would have resulted in an increase in the inequality of income distribution.

Grosse, Harttgen and S. Klasen (2006), to monitor progress in MDG 1[13] (Millennium Development Goals) and explicitly link growth, inequality and poverty reduction, expanded the growth indicators pro-poor, especially those derived from the growth incidence curve, to measure the distributive impact of growth and its relation to poverty reduction in the non-economic dimensions of poverty (particularly health and education). Applying to the case of Bolivia they show that this approach allows for a much more detailed assessment of progress towards MDGs 2-7[14]. Indeed, for the period 1989-1998, for most of the objectives they find favorable progress for the poor, so that the poor participated in this progress in a greater proportion than the non-poor, particularly in the expansion of education, health care, female employment, and access to water and sanitation.

Another work is that of Ochoa and Zapata (2007), in which, using different methodologies, they explore the benefits and costs faced by the poorest in Bolivia during the period 1994-1997, considered high growth, and in the period 1999- 2002, of economic contraction, obtaining as main result that the benefits of growth and the losses of economic contractions are distributed unequally among the population. While the poor benefit from greater economic growth, they do so to a lesser extent than wealthy households. On the contrary, when the economy contracts, the poor incur greater losses than the families with higher incomes.

On the other hand, Herrera (2014) under the concept of inclusive growth, examines the benefits of the high economic growth that the Bolivian economy registered in the period 1999-2012 in terms of equity of opportunities as a mechanism for poverty reduction and long-term development. The main finding is evidence in favor of the inclusiveness hypothesis in most of the opportunities considered (literacy, education, health and employment), except in primary education, but without achieving equity, which would negatively affect potential growth, the reduction of poverty and economic development of the country.

In a recent work, Vargas and Garriga (2015) investigate the factors that drive the results in the reduction of inequality and poverty during the last 15 years. The results suggest that the reduction of poverty was due mainly to the growth of labor income at the lower end of the income distribution, although increases in non-labor income (rents, transfers and remittances) also had a positive effect, but of a smaller magnitude, despite the fact that Renta Dignidad has made a big difference for the poor elderly. The increase

13 MDG 1: reduction of extreme poverty.

14 MDG 2: goal close to 100% in the completion of primary education; MDG 3 (gender): implicit in education; MDG.

in labor income was concentrated in the low-skilled, informal services and manufacturing sectors. An implication of this result is that, in a context of deceleration and an eventual economic crisis, labor policies should be designed to preserve the achievements made in reducing poverty and inequality in the last fifteen years.

5. Methodology

To measure the economic growth impact of the Bolivian economy during a large part of the first decade of the year 2000 and the first years of the following decade and of the redistribution of income in the same period on the reduction of poverty, the following section decomposes the poverty index between the effects of growth and redistribution through the methodology used by ECLAC (2003) and the one proposed by Datt-Ravallion (1992), described in section 3.2. For this purpose, projections of the poverty index are made, considering different combinations of growth and reduction of inequality, compatible with the reduction of poverty in the period 2005-2014 and considering the data from the 2005 Household Survey.

6. Empirical evidence

The decomposition of the poverty index carried out in this section is based on ECLAC (2003). Within the framework of the objective of this chapter, the purpose of the exercises is to analyze the growth and income distribution effect in reducing poverty in the 2005-2014 period.

In general terms, the incidence of poverty can be expressed as a function of the original distribution of income, F (y), of the poverty line (z), and of the simulation parameters of inequality (α) and economic growth (β). In formal terms, we have:

$$P^* = P^*(\alpha, \beta, F(y), z) \qquad (5)$$

From (5) there is a range of combinations of parameters that allow the replication of poverty rates, which is known as iso-poverty curves (for details see ECLAC, 2003).

From this relationship, the decomposition of poverty estimates is made in the next section, first considering only the growth effect and, subsequently, both effects, growth and distribution.

6.1. Data

Period of analysis: 2005 - 2014.

GDP growth rates p.c. published by the INE.

Annual projections of the INE population (quarterly[15]).

15 To this end, quarterly growth rates calculated with the annual data of the INE at the national level and available at http://www.ine.gob.bo/

Survey of Homes 2005 of the INE.

First, in order to link the growth effect of GDP with the income of the Bolivian population, the income of households is increased considering the GDP growth rates. Then, the growth rate per capita income is calculated with a quarterly frequency, using the following relationship:

$$ypc_q^t = ypc_{q-1}^{t(t-1)} \cdot (1 + tcPIB_{q-1}) \qquad (6)$$

where

ypc_q^t : growth rate of per capita income in the q quarter of year t.

$ypc_{q-1}^{t(t-1)}$: growth rate of per capita income in the q-1 quarter of year t-1 or t.

$tcPIB_{q-1}$: GDP growth rate in Q-1 quarter.

6.2 Results

6.2.1 Projections of poverty with growth

When only the effect of growth on household income is considered, estimates of extreme poverty at the national level are reasonably adjusted to official figures only between the last quarter of 2005 and the second of 2008, a result that seems to suggest that in that period, extreme poverty declined mainly due to the growth effect.

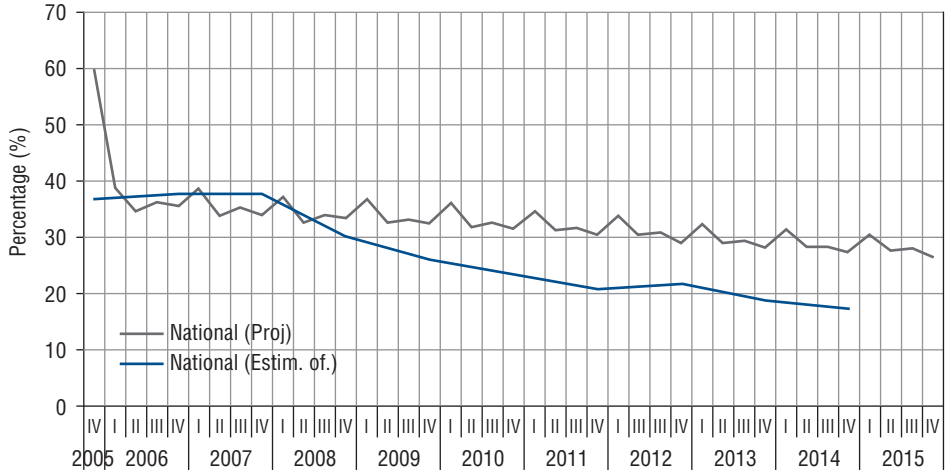
From the third quarter of that year until the last quarter of 2014[16], there is a growing gap between the projections and the official figures [17]of the INE (Graph 7). In this way, the results imply that in this period extreme poverty was not reduced only by growth, but by other factors such as the distribution effect, an aspect that is examined in the following section.

On the other hand, estimates of extreme poverty disaggregated by urban and rural areas, indicate in the first case that the growth effect was the main factor driving the reduction of extreme poverty, since the estimates are close to the official figures (Graph 1, Annex). In the case of the rural area, the situation is the opposite, appreciating the presence of a gap that increases since 2008 (Graph 2, Annex).

16 Until the conclusion of this chapter, the INE did not publish the official poverty figures for 2015.

17 These are carried out by the INE carried out once a year (last quarter).

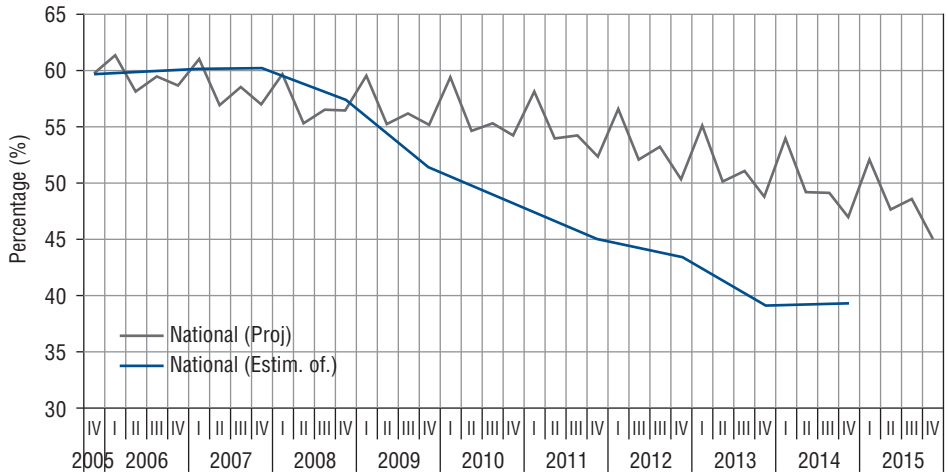
Graph 7
Projections of extreme poverty and official estimates at national level, in percentages



Source: Own elaboration with data from the INE and the Household Survey 2005

In the case of moderate poverty, a similar situation is found, except that the growth effect reasonably explains the reduction of poverty up to the third quarter of 2009, after which a growing gap was observed (Graph 8) that could be explained by factors other than growth.

Graph 8
Projections of moderate poverty and official estimates at national level, in percentages



Source: Own elaboration with data from the INE and the Household Survey 2005

The results of the decomposition at the urban and rural areas indicate that in the first case the growth effect reasonably explains the reduction of poverty throughout the period (Graph 3, Annex), while in the rural area the estimates diverge from the official figures systematically starting in 2008, showing a very weak relation between poverty reduction and growth (Graph 4, Annex).

6.2.2 Poverty projections with growth and distribution

To have evidence about the hypothesis that the redistribution of income is one of the important factors that explains the differences between the estimates of the poverty index and official data, this section makes projections of poverty considering the growth effects together and distribution.

The growth effect, measured by the parameter α, is approximated by the quarterly GDP growth rates per capita[18] and for the distribution effect a set of values is assumed for the parameter β in order to approximate the poverty figures estimated by the INE. The values of the distribution coefficient are summarized in Table 1.

Table 1
Parameters of the distribution effect

Period	β	
	Moderate Extreme	Poverty Poverty
2005:1-2009:3	0%	0%
2009:4-2010:4	10%	0,50%
2011:1-2012:4	0,50%	0,50%
2013:1-2014:4	0%	0%

Source: self-made.

Following the methodology of ECLAC (2003), the following expression is used to analyze the impact of both the growth effect and the distribution effect on poverty reduction (moderate or extreme):

$$yhogpc_q^t = (1-\beta)\times[(1+\alpha)\times yhogpc_{q-1}^{t(t-1)}\times\beta\times\overline{yhogpc_{q-1}^t} \qquad (7)$$

where

$yhogpc_q^t$: growth rate of per capita income of households in the q quarter of year t

$yhogpc_{q-1}^{t(t-1)}$:rate of growth of per capita income of households in the q-1 quarter of year t-1 or t

18 The information is summarized in Table 1 of the Annex.

$\overline{yhogpc_{q-1}^{t}}$: average income of households in the quarter q-1 of year t

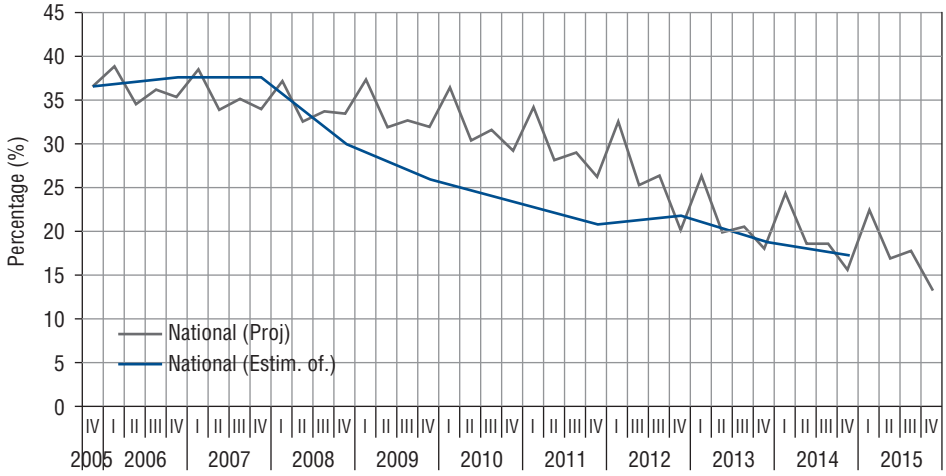
α : growth effect, with 0 <α <1

β : distribution effect, with β> 0

When both effects, growth and distribution are considered simultaneously, the results show a reasonable approximation to the official estimates of extreme poverty of the INE, except between the end of 2008 and Middle 2012. In this sense, it is evident that the distribution of income (effect distribution) plays at least as important a role as the growth effect in reducing extreme poverty (Graph 9).

With regard to moderate poverty, in terms of moderate poverty, the estimates are closer to the official figures (Graph 10). In this sense, the combination of the effects of growth and distribution would be the main factors of the reduction of moderate poverty in the 2005 period: 4-2014: 4.

Graph 9
Projections of extreme poverty at national level with effects growth and distribution
(In percentages)

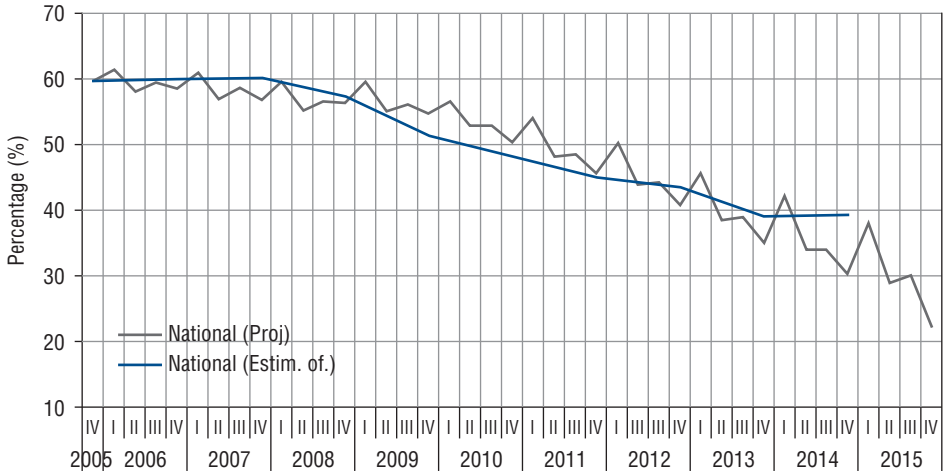


Source: Own elaboration with data from the INE and the Household Survey 2005.

When examining the results of the decomposition of the extreme poverty index at the urban and rural area level, it is noted that in the urban area the part not explained by the growth effect is reasonably explained by the distribution effect (Graph 5, Annex). On the other hand, in the rural area there is a gap between 2008: 4 and 2012: 2 (Graph 6, Annex), which would correspond to the residue of Datt-Ravallion (1992).

In terms of moderate poverty, the results of decomposition at the level of urban and rural areas do not differ substantially from the case of extreme poverty (Figures 7 and 8, Annex). Thus, in the rural area, between 2008 and 2012, the distribution effect does not explain a significant proportion of that part not explained by the growth effect.

Graph 10
Projections of moderate poverty at national level with effects growth and distribution, in percentages



Source: Own elaboration with data from the INE and the Household Survey 2005.

6.2.3. Decomposition Datt-Ravallion

In order to contrast the results obtained through the CEPAL methodology (2003), the results of the decomposition of Datt-Ravallion (1992), both extreme and moderate poverty, are applied and analyzed. For this purpose, two household surveys of the INE are used, the first of the year 2005 and the second of 2014.

Although the magnitude of the estimates of the reductions in poverty (absolute and moderate) are not identical to the observed figures, according to official sources such as the Dossier of Statistics of UDAPE vol. 26, are analogous, appreciating in the period 2005-2014 in the urban area, a reduction of moderate poverty greater in relation to the reduction of extreme poverty, while in the rural area the decrease of extreme poverty was more accelerated with respect to the one of moderate poverty.

Indeed, between 2005 and 2014, according to the Datt-Ravallion methodology at the national level, extreme poverty fell by 19.3 percentage points, which is explained by 13.5 pp. for the growth effect and 1.19 pp. because of the redistribution effect, a result that suggests that the distribution of income measured, for example, by the Gini coefficient, would have been modified. Likewise, in the urban area, extreme poverty fell by 12.1 pp., Explained by the growth effect of 10 pp. and by the distribution effect of 1.2 pp. In the rural area, the reduction reached 29.5 percentage points, corresponding to the growth effect of 25.3 percentage points, although the redistribution effect had an effect on the reverse, while the interaction component, known in the literature as the residual of Ravallion is considerably elevated (Table 2).

The effect of the reversal of the distribution effect would mean that by keeping income constant over time and modifying the Lorenz curve, a change in the distribution

of income in the rural area would have been recorded between 2005 and 2014. According to the document by Vargas and Garriga (2015) there was an increase in labor income that is explained by an increase in the income of both skilled and less qualified workers. However, in some cases, the increase in the income of the less qualified would have been greater than that of the most qualified. This fact could be signifying a transformation of the structure of Bolivian society, as it has been explained by the UNDP documents (2016), which indicate an increase in the size of the middle class in Bolivia.

Regarding the Datt-Ravallion residual, it can be hypothesized that higher economic growth may be benefiting some sectors more than others and, on the other hand, based on the available data, conditional cash transfers also benefit some sectors of the economy population that are not necessarily poor, which could be increasing the inequality of income distribution. Indeed, using the Household Survey of 2014, it is appreciated that while there is a reasonable focus of the "bonds", at the same time it is noticed that these transfers also reach people who are not poor. Thus, of the total of the extreme poor, 85% receive some monetary transfer and of the total of non-poor extreme 71% benefit from some monetary transfers; in the case of moderate poverty, these proportions are 83% and 68%, respectively.

Table 2
Extreme poverty: datt-ravalion decomposition

Poverty Rate (p0)	National	Urban	Rural
2005	36.53	20.34	65.58
2006	17.23	8.27	36.10
Change in p0	-19.31	-12.07	-29.48
Growing component	-13.50	-10.03	-25.28
Redistribution component	-1.91	-1.17	9.01
Interaction component	-3.90	-0.88	-13.20

Source: Own elaboration with data from the INE and the Household Survey 2005.

With regard to moderate poverty, between 2005 and 2014 it decreased nationally by 20.2 percentage points, of which the growth effect is more than 19 pp. With regard to the reduction of moderate poverty in the urban area, this was greater than the reduction of extreme poverty, which is explained almost entirely by the growth effect. Finally, in the rural area, the reduction was greater than on the urban area, although it was smaller in relation to the reduction of extreme poverty. However, one aspect that is striking is that in both areas the distribution effect operated in reverse, slightly counteracting the growth effect (Table 3).

Table 3
Moderate poverty: datt-ravallion decomposition

Poverty Rate (p0)	National	Urban	Rural
2005	59.36	47.86	80.00
2006	39.17	30.47	57.51
Change in p0	-20.19	-17.40	-22.49
Growing component	-19.13	-16.69	-25.92
Redistribution component	4.08	2.21	9.62
Interaction component	-5.15	-2.91	-6.19

Source: Own elaboration with data from the Household Survey 2005 and 2014.

7. Conclusions

In the 2003-2013 period, Bolivia registered substantially higher annual growth rates than in the previous period 1992-2002, which was accompanied by a reduction in extreme poverty and a decrease in the inequality of income distribution, suggesting that the greater growth would have benefited the poor more. in relation to the non-poor, thus favoring the hypothesis of pro-poor growth.

In this regard, given that the empirical evidence in favor of this hypothesis is limited, the objective of this chapter is to find evidence about the hypothesis that the decrease in poverty in the recent period has been due to the growth effect, mainly, using the micro-simulation technique with data from the Household Survey 2005 and 2014. The main conclusions reached are the following:

In 2005, Bolivia was the country with the highest incidence of extreme poverty, with 38% of the population living in conditions of severe deprivation of basic human needs, with the rural area being the most affected. In the same year, at the other extreme, Chile had an incidence of absolute poverty of only 3%. After ten years, in 2014 this percentage decreased drastically to 17.3%, although it continues to be the second highest in the region.

In the period 2006-2012, significant progress was also observed in the reduction of inequality in the distribution of income measured by the Gini coefficient, which was largely due to the dynamism of economic activity, favored by the international context that was conducive to the performance of developing economies, enabling the implementation of a policy of conditional cash transfers. In this framework, the Gini coefficient fell sharply until reaching the historical low of 0.47 in 2011.

In the period 2005-2009, through micro-simulation exercises it is evident that the reduction of poverty (extreme and moderate) in Bolivia is mainly explained by the growth effect, particularly in the urban area, since in the rural area this relationship is only observed in the first three years of this period.

By simultaneously examining the effects of growth and distribution, it is observed that these explain significantly the reduction of poverty (extreme and moderate) throughout the period 2005-2014, a result that suggests that poverty reduction would

have been due to a combination of the effects of growth and distribution, but with predominance of growth.

The decomposition of Datt-Ravalion shows that the growth effect is the most important in reducing extreme poverty, both nationally and at the level of urban and rural areas. However, in the case of moderate poverty, the growth effect was partially offset by a reverse effect of the redistribution effect, particularly in the rural area.

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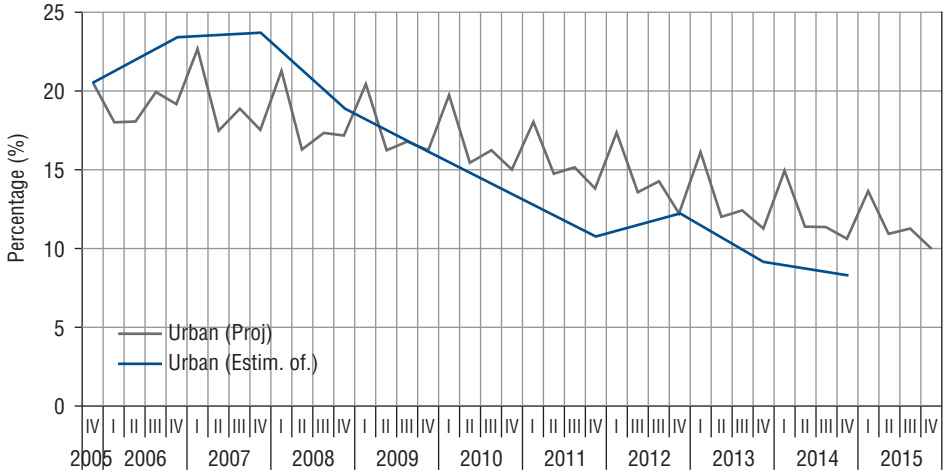
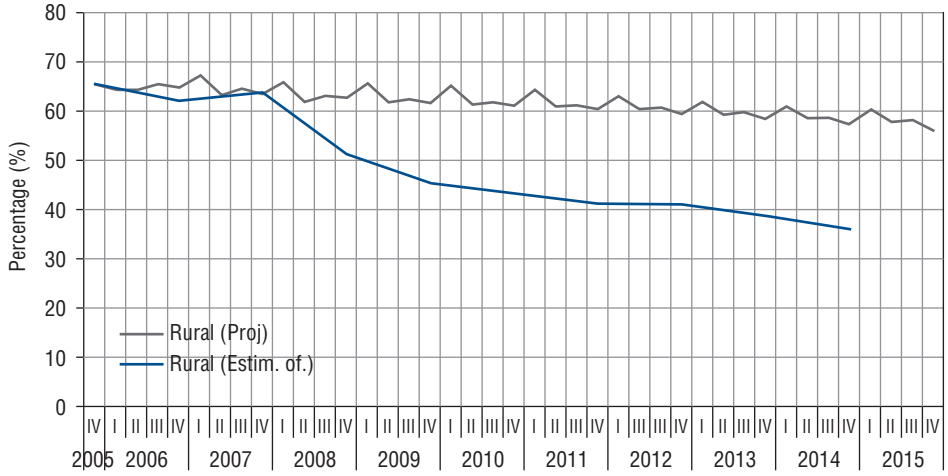
Annex

Graph 1
Projections of extreme poverty in the urban area with effect growth, in percentages



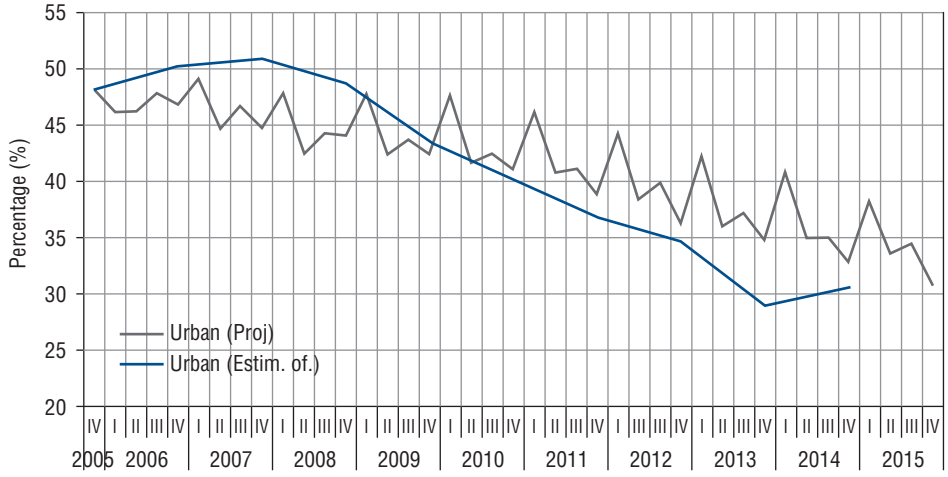
Source: Own elaboration with data from the INE and the Household Survey 2005.

Graph 2
Projections of extreme poverty in the rural area with effect growth, in percentages



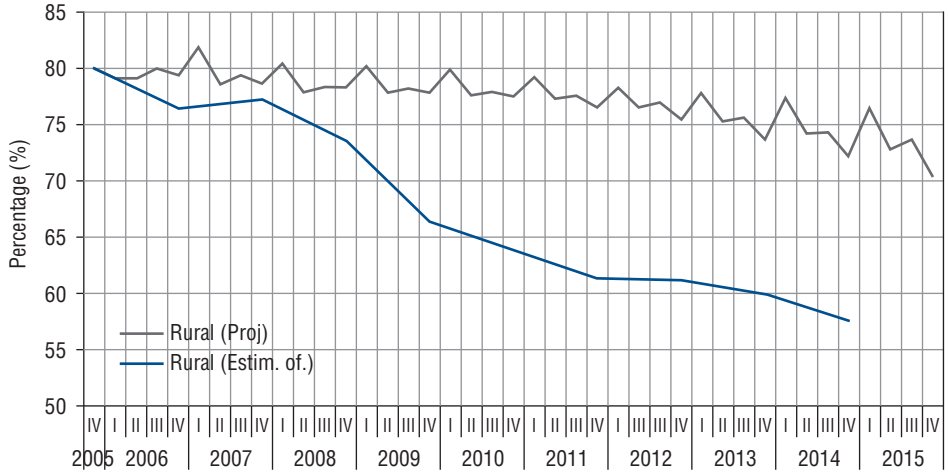
Source: Own elaboration with data from the INE and the Household Survey 2005.

Graph 3
Projections of moderate poverty in the urban area with growth effect, in percentages



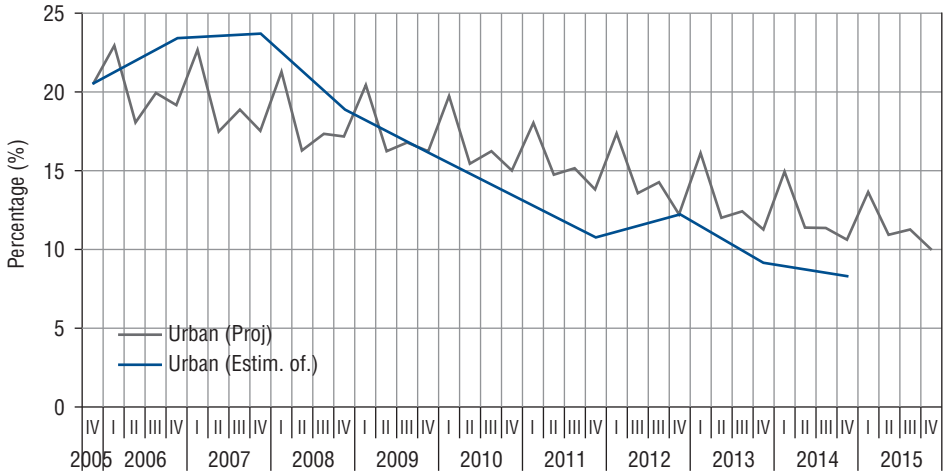
Source: Own elaboration with data from the INE and the Household Survey 2005.

Graph 4
Projections of moderate poverty in the rural area with growth effect, in percentage



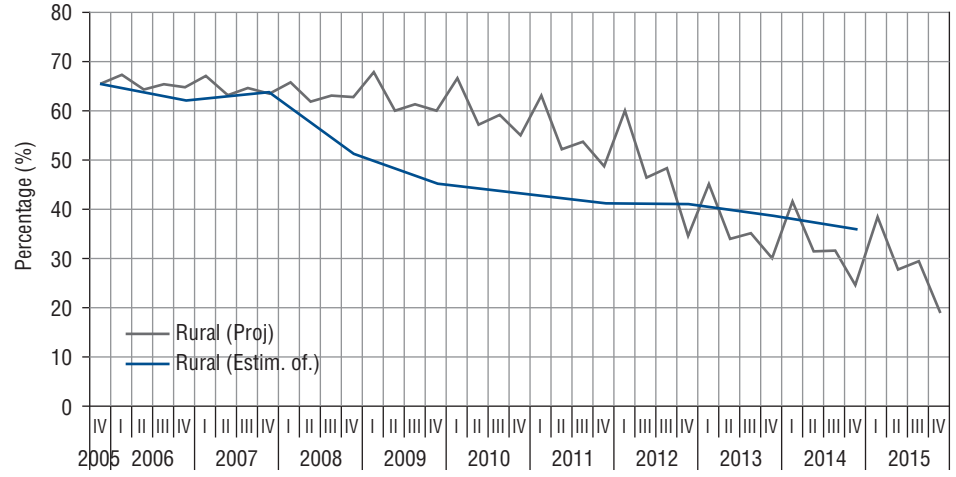
Source: Own elaboration with data from the INE and the Household Survey 2005.

Graph 5
Projections of extreme poverty in the area urban with effects growth and distribution
(In percentages)



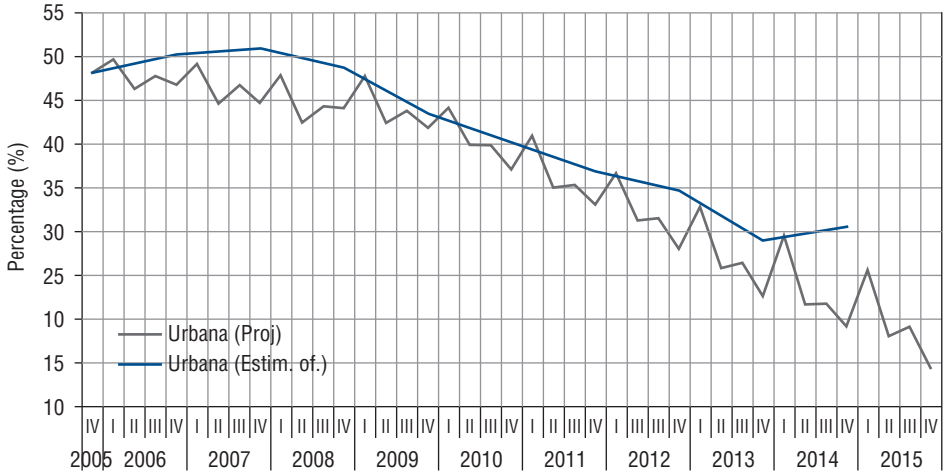
Source: Own elaboration with data from the INE and the Household Survey 2005.

Graph 6
Projections of extreme poverty in the rural area with effects growth and distribution
(In percentages)



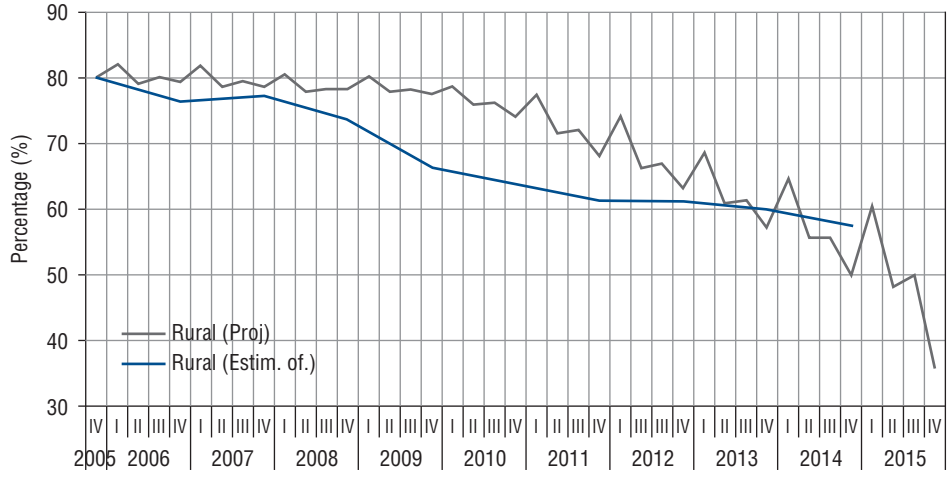
Source: Own elaboration with data from the INE and the Household Survey 2005.

Graph 7
Projections of moderate poverty in the area urban with effects growth and distribution
(In percentages)



Source: Own elaboration with data from the INE and the Household Survey 2005.

Graph 8
Projections of moderate poverty in the rural area with growth and distribution effects
(In percentages)



Source: Own elaboration with data from the INE and the Household Survey 2005.

Table 1
Inter-quarter growth rates of gdp per capita, in percentages

	Quarter I	Quarter II	Quarter III	Quarter IV
2005	-6.23	14.33	-6.99	3.82
2006	-7.16	13.74	-5.19	3.28
2007	-9.50	15.49	-4.04	4.04
2008	-9.11	15.86	-3.88	1.26
2009	10.19	-15.02	2.53	-2.24
2010	-11.40	15.65	-2.59	4.16
2011	-10.95	13.57	-1.68	4.23
2012	-11.18	12.90	-1.47	6.09
2013	-10.98	12.96	-1.34	6.24
2014	-12.02	11.97	0.13	5.42
2015	-12.53	12.44	-1.54	7.80

Source: Own elaboration with data from the INE.

Social Mobility, Poverty and Inequality in a Multiethnic Society

Reconfiguration, Stratification and Change in Social Levels of Bolivians at urban and rural level (1996-2016)

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Ludwing Torres Carrasco[2]

Abstract[3]

Social mobility provides a reading of the rise (or decline) of individuals within an economy structured by social classes. A situation characterized by high poverty, marked levels of inequality and low social mobility, are elements of low growth and therefore little development. Bolivia in the last few years has shown a growth of the product, poverty reduction and inequality that has influenced the improvement of the well-being of its inhabitants, so it merits inquiring about whether in Bolivia during the period of external bonanza there was social mobility and what was its I link with the indicators of well-being. In this sense, this research will seek to quantify social mobility in Bolivia and see its trend over time, investigating its relationship with poverty and inequality, seeking to provide an explanation to movements and trends nuanced by political, economic and social changes. Social issues that the country went through. The results of the estimations show that extreme poverty in particular and moderate poverty experienced a significant decrease in its incidence, gap and severity during the bonanza, monetary inequality, although it was reduced, remains high for Bolivia according to international standards, the inequities not only of income cover the population as a whole. In terms of mobility, there is evidence of a structural, social upward mobility, especially in the period after the bonanza, due to

1 The present research was carried out within the framework of the Postdoctoral Fellowship awarded by the Freie Universität Berlin (FU-Berlin) and the postdoctoral stay at the Pontifical Catholic University of Peru (PUCP) through the Postgraduate Program in Sustainable Development and Social Inequalities of the Andean Region (trAndeS). I would like to thank Prof. Omar Pereira Cáceres Ph.D. from Pontificia Universidad Catolica del Peru (PUCP), for his valuable comments to a previous version of this document. Comments to: ivan.velasquez@kas.de, velasquezivanomar@gmail.com

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3 The views and opinions contained in the document do not necessarily reflect the position of any institution with which the authors are affiliated. Errors or omissions in the document are the sole responsibility of the authors.

the improvement in the distribution of income, economic growth, and the bonanza of raw resources, improvements in the SMN, remittances from abroad, conditional transfers and the favorable external context. However, if mobility is seen as a whole (1996-2016), its tendency is moderate, slow and progressive and marked by a reduction in the high income stratum, a significant and significant increase in the middle stratum, promotion and significant increase in the low income stratum.

Keywords: Bolivia, social mobility, poverty, inequality, economic growth.

1. Introduction

Social mobility can be defined generically as any change in the time of the social and economic attributes of a subject, be it a person, a home or a social group. To study social mobility, it is necessary, therefore, to record the economic history of the corresponding subject, or deduce it from special statistical techniques (Marcel, M., 2009). Poverty, inequality and social mobility are phenomena that are definitely linked. Societies where poverty levels are high and inequality reaches the population as a whole among the different strata of society, it would be difficult the mobility among its inhabitants, also when economic opportunities and human development favor small groups of society, very likely that poverty and inequality are persistent and high. In this sense, if the concentration of opportunities is persistent over time and, therefore, there is little social mobility, poverty and inequality will tend to perpetuate (Table 1).

Table 1
Taxonomy: Poverty, inequality and social mobility

		Low Poverty	High Poverty
Low inequity	Low social mobility		Countries with very low income per capita and with a high percentage of the population in a situation of "poverty trap"
	High social mobility	Countries with broad access to both human capital and economic opportunities, with efficient mechanisms of redistribution and social protection	Countries with very low income per capita and very little accumulation of capital, which is just beginning to develop the possibilities of economic development
High inequity	Low social mobility	countries with high income levels that meet the basic needs of the population, but in which the economic and human development opportunities are still concentrated in few people	countries in which economic opportunities are concentrated in a few and these tend to transfer between families, are societies with high discrimination and social exclusion
	High social mobility		countries with high levels of risk and constant shocks to income and assets, and inefficient social protection mechanisms

Source: Inter-American Development Bank (IDB) - INDES, 2010. Social reality.
Elaboration: IDB - INDES.

Social mobility, and its measurement, implies the understanding of the meritocratic degrees of class placement within a society. A society characterized by low social mobility comprises individuals of the upper social classes with a legacy or by having obtained their income by illegitimate means, and a low class, which can include very poor people, who inter-generationally maintain this condition. The socio-economic and political context can also be a determinant of social mobility, since, if it is favorable, it will be more feasible to ascend in good times, and descend in times of crisis. The study of social mobility[4] allows to establish the most demanding measure about the opportunities for progress and well-being open in a society. Extensive literature and empirical evidence highlight the importance of the issue of social mobility to explain how the cycles and pendulums of the economy may be related to changes in the social strata and the emergence of new elites or their regression. From its origins in the early twentieth century, research on social mobility has discussed the articulation between social mobility systems and economic systems (for example: changes in strata and / or social classes in scenarios of market economy, centralized or economy planned, etc. and its relation to the reversal of inequality and poverty reduction).

The nature of this relationship can be verified by reviewing the literature of the first studies on social mobility in the United States (Sorokin, 1927[5]) and then expanding to the rest of the industrial world of the West (Lipset and Zetterberg, 1959). Since the 1970s, most of the work on the subject revolves around the so-called hypothesis FJH (Featherman, Jones and Hauser, 1975), which states that the social mobility systems of Western industrial societies are substantially fluid and homogeneous. For the Bolivian case it is important to first identify if there is a correlation (positive or negative) between the neoliberal and / or statist systems or models implemented in Bolivia with social mobility and how this has been expressed in form, magnitude and impact on poverty reduction or increase in inequality or inequities which we will see later.

On welfare aspects (Poverty, but especially inequality, among others) can be identified in research conducted in the 60's. Friedman (1962: 1971-72) illustrates the potential relationship between inequality and mobility: "Consider two societies with the same distribution of annual income. In one there is great mobility and change, so that the position of families in the income hierarchy varies widely from one year to the next. In the other, there is great rigidity so that families remain in the same position over the years. Clearly, the second society will be more unequal than the first. The type of inequality of the first is a sign of dynamic change, social mobility, equal opportunities, in the second society, it is a sign of a statutory society ". This reference highlights the need to distinguish two types of inequality: The inequality of economic conditions, measured at a moment in time; and inequality of opportunity or mobility, measured as the persistence of economic advantages or disadvantages over time. At the operational level, these dimensions are

4 In this research, as in most studies on the subject, it is considered that occupational mobility is close to social mobility, given the close relationship between the two. Bolivia is not the exception, it is simply worth comparing the correspondence between schooling, income and occupational stratum.

5 Sorokin, Pitirim (1927). Social mobility. New York: Harper & Brothers.

captured with the statistical concepts of variance and intergenerational correlation, respectively.

In another theoretical scenario, the academic discussion on social mobility led to a crucial confrontation between liberal sociologists and materialists. For the former, the industrial and post-industrial economic structure based on the market, on its own and with greater reason thanks to the reforms of the markets, leads to a relatively constant expansion of opportunities for social mobility, that is, an equalization of the opportunities (Featherman, Jones and Hauser, 1975[6]). The latter, who hold a diversity of positions, agree that this trend does not exist (Goldthorpe, 1987, Erikson and Goldthorpe, 1992, Haller, 1990). Thus, in these analyzes it is crucial to establish and identify the notion of a close relationship between the economic system and the social mobility system. These ideas can be explored in Latin America in general and in Bolivia in particular, which has gone from an accumulation model (oriented towards the internal market) that produced the urbanization, growth and development of the region, to another that in general terms It has translated into a deterioration in economic growth and the capacity of the State to handle the new international circumstances, and in the accentuation of economic and social inequality.

In Bolivia, unfortunately, the effects of this transit on the levels of poverty and inequality in the distribution of income have not been studied. Likewise, little research has been done on the evolution of the population with respect to job creation and what has hardly been studied in the Bolivian context is the relationship between economic reform and the degree of equity of the social mobility system. Given the deterioration of growth in various phases of its economic cycle and the notable economic oscillations recorded by the price variations of its export basket, it is essential to carry out this analysis with a methodology that allows the measurement of structural mobility, which results precisely from the changes in the population, economic growth and the creation of employment sources in each occupational stratum.

In this perspective, the last twenty years in Bolivia are characterized by the deployment of two different processes that also gave rise to two political-economic cycles. The first named neoliberal that began in August 1985, with the application of D.S. 21060, and ended in 2005, and the second of a neo-statist character that began in January 2005 with the government of President Juan Evo Morales Aima. The study period is precisely located within these two cycles. Beyond the macroeconomic reforms (widely studied) what is really important is to investigate the effects of the reforms and economic policy measures implemented between 1996 and 2016 and their relationship with welfare and especially with respect to the social mobility of Bolivians to microeconomic level.

The neoliberal model is born as a response to the exhaustion and crisis of the statist model that was in force since the 1950s. Crisis that in the first half of the eighties was expressed in hyperinflation and economic depression. The D.S. 21060 (1985), was aimed at curbing hyperinflation and restoring basic macroeconomic balances, it also included a set of reforms called first generation, and this set of reforms without a doubt had a

6 Check Featherman, Jones & Hauser (1975); Erikson & Goldthorpe (1992).

remarkable success and laid the foundations of economic stabilization and ordering of macroeconomic variables and the establishment of fundamental macro equilibrium.

Subsequently, in the second half of the nineties the reforms gained a notable boost. Together, these were aimed at resizing the role of the State in the economy, focusing its actions on social investment and human capital and assigning greater prominence to private capital to expand the productive capacity of the economy. A relevant aspect of the period was the beginning of a decentralization process, taking as a reference first the municipalities and then in a more limited scheme to the prefectures whose central characteristic was the decentralization of resources and the search for a better distribution of income. The aforementioned was to reverse the excessive economic and political centralization that characterized the State since the founding of the Republic.

The politicians who promoted the application of the neoliberal model stimulated exaggerated expectations in the population, which could not be met due to external and internal factors. Externally, the direct and indirect impact of the Asian crisis of 1997-1998 deteriorated the terms of trade and, consequently, exports, and the strong devaluations carried out by neighboring countries such as Brazil and Argentina, negatively impacted the domestic industry. The effect was a marked economic deterioration, which was expressed in a deceleration of economic activity until 2004-2005 and an increase in unemployment. Internally, the reforms applied delayed, by their very nature, in maturing; that is, to bear fruit in terms of accelerating growth and improving the living conditions of the population, taking into account the expectations that the population had.

The discovery of important reserves of natural gas, the increase in purchases of this resource by Brazil and the increase in external prices stimulated the population's expectations to capture part of the income generated by natural gas. On the other hand, as of 1998, illegal coca plantations were drastically reduced, generating a negative economic impact due to worsening economic conditions and increasing unemployment. These factors propitiated the discontent that led to the resignation of two constitutional presidents of the country and the call for presidential elections at the end of 2005, in which the current president triumphed, who began to govern from January 2006.

Beginning with the first government of President Morales, a set of measures began to be applied that aimed at repositioning the role of the State in the economy, through the reversal of previous reforms, and through several nationalizations of productive enterprises and services. Likewise, more emphasis was given to social policy, the redistribution of income and the investment of infrastructure for development. A new Political Constitution of the State (CPE) was approved, which defines a new institutional framework and regulations for the country. Also, during this period, the boom in raw materials, mainly hydrocarbons and minerals, that generated growth and income for Bolivia and established interesting advances in the social and economic area from measures in favor of income distribution.

Finally, with regard to the methodological aspects, although there are several alternatives to quantify social mobility, without a doubt, the great limitation includes the characteristic and form in which the data are found; for the present investigation, the methodological feasibility of generating a calculation approximation was chosen through the collection of cross-section data from household surveys, using the occupation and

income information of parents and children, but also a vector of covariates that allow provide a quantification in time through inter-annual variation, with this, we intend to generate a stratification based on the probability of belonging to a specific category. The results of the estimations show a moderate, slow and progressive increase in social mobility, marked by a reduction in the high income stratum, a significant increase in the middle stratum, a rise and an important increase in the low income stratum.

The research is organized as follows, after this introduction, section 2 makes a brief review of academic literature on the subject, and previous studies of quantification of social mobility in Bolivia; in section 3, the methodology for calculating and estimating social mobility and income stratification is explained. The empirical evidence and the results are presented in section 4, and the conclusions and recommendations of public policy are made in section 5.

2. Literature review

Extensive empirical evidence and literature on social mobility has highlighted that in every society there are more or less pronounced differences in material wealth, power and prestige among its members (H. Kerbo, 1998, D. Grusky, 1994), these differences they generate a set of social inequalities that structure the so-called social stratification system. In this sense, its study is important since the system of social stratification expresses hierarchies between groups or social strata and the existence of an institutionalized inequality in the access that individuals and groups have to resources, public services and positions that society values (H. Kerbo, 1998, D. Grusky, 1994).

In this way, a structured inequality is expressed, while determining who receives what and the criteria by which the different groups access the various social opportunities. These opportunities, in turn, are related to what M. Weber (1964) defined as life chances (Life chances) and, therefore, to the ways in which the various social categories of people access welfare or what TH Marshall (1977) defined as social citizenship. On the other hand, as societies become technologically more complex, the social division of labor and social differentiation increase, which sets the stage for greater social inequality.

However, at the same time, modern society establishes as a normative principle the increasing equalization of social opportunities, which is linked to the possibilities that different social groups have of accessing or mobilizing towards positions of greater prestige and social recognition. Therefore, what appears sociologically and economically important is the analysis of the structure of the Bolivian social stratification in terms of the different social positions that compose it, the relative importance of each one of them and the access they provide to the opportunities of life of people and their families.

All this as a first step for the analysis of social mobility patterns that are the essential complement for an evaluation of the greater or less equalization of social opportunities. According to Filgueira, C. (2001[7]) at the empirical level, the initial development of the

7 Filgueira, Carlos H. (2001). La actualidad de viejas temáticas: sobre los estudios de clase, estratificación y movilidad social en América Latina. CEPAL. División de Desarrollo Social, Serie Políticas Sociales No.51. ISBN: 92-1-321888-5.

stratification and social mobility studies in the region was linked to the intellectual aspects of different sign that prevailed at the time, the influence of the study programs that Germani Gino (1962[8] and 1963[9]) and his teams from the University of Buenos Aires, as well as other researchers from the region such as Solari A. (1956[10] 1961[11]) from the Institute of Social Sciences of Montevideo, Hutchinson, B. (1961[12]), seconded to the Research Center of Rio de Janeiro, G. Costa Pinto, and E. Hamuy in the Institute of Sociology of the University of Chile. The inspiring model in Social Stratification studies was the pioneering work of D. Glass on England, or of sociology in the United States, in particular, within the structural-functionalist paradigm. With the variants of the case, authors such as S. M. Lipset, R. Bendix, O.D. Duncan, J. A. Kahl, P.M. Blau, were a reference of this current that, in turn, had given continuity to three foundational works on the subject:

a. On the one hand, the influential and controversial work of Davies and Moore: Some Principles of Stratification of 1945,
b. and on the other, the pioneering work that forms the basis of Natalie Rogoff's occupational mobility studies of 1953, Recent Trends in Occupational Mobility,
c. in addition to the later work of synthesis contained in the book of B. Barber, Social Stratification of 1957

According to Filgueira, C. (2001), other aspects also influenced the development of the paradigm. In this case the contribution came more from the European intellectual tradition or more precisely from different traditions, especially from the Marxist and Weberian aspects. In most cases the contribution was critical or openly belligerent and at least it melted more or less harmoniously with the guiding principles of the paradigm. In this regard, it is possible to distinguish the community of European researchers and in particular English and French nucleated in different research centers since the 50s. Among these were the pioneering E.P. Thompson, D. Lockwood, J.H. Goldthorpe, A. Touraine, the sociologists of the conflict, such as R. Dahrendorf or J. Rex, in addition to the more orthodox Marxist elaborations of L. Althousser, and N. Poulantzas.

Without ignoring the impact represented by the work of T. H. Marshall and especially his classic article Citizenship and social Class of 1963. This second aspect had equally influential figures among which stands out especially M. Tumin, H. Gertz, and C.W. Mills The paradigm emphasized social mobility as a fundamental object of research, critical views were made in the formation of classes or collective aggregates that were assumed,

8 Germani, Gino (1962). Política y Sociedad en una Epoca de Transición: De la Sociedad Tradicional a la Sociedad de Masas. Buenos Aires: Paidós: Paidós.

9 Germani, Gino (1963). Movilidad Social en la Argentina. En Seymour Lipset y Reinhard Bendix (Comps.), Movilidad Social en la Sociedad Industrial, Apéndice II (317-366). Buenos Aires: EUDEBA.

10 Solari A. (1956). Las clases sociales y su gravitación en la estructura política y social del Uruguay. Rev. Mex. Soc. 18 (2). México.

11 Solari A., y Labbens J. (1961). Movilidad social en Montevideo. Boletim do Centro Latino-Americano de Pesquisas em Ciencias Sociais", 4(4), Rio de Janeiro.

12 Hutchinson, Bertram (1961). Trabalho e mobilidade. Rio de Janeiro: MEC-Centro Brasileiro de Pesquisas Educacionais.

constituted the basis of power and conflict of society (identities, sense of belonging, collective action).

In the confrontation between both slopes, more general conceptions of society and different readings of the classics converged. But from a brief intellectual genealogy of the derivations of Marx, Weber and Durkheim, it is clear that while Marxist and leftist views originated criticisms of the conservative nature of social mobility research by ignoring the most relevant problems From the stratification as the division and class conflict, from the first side came the criticism of the forced and ideological character of the conception of class society. More specifically, the debate refers above all to the criticism directed at researchers from the United States, under the assumption that they consciously sought to divert attention from the forms of exploitation of capitalism at the beginning of the second half of the last century, for the sake of apologetic affirmation of the individualistic and liberal values of North American society (Filgueira, C., 2001).

The second component of cross-criticism was focused on analysis techniques. The specific option of basing studies of mobility and stratification in surveys of type survey and in quantitative methodologies of treatment of information, was perceived from the critical side as a natural and complementary component of the substantive conservatism of the analysis of mobility to the detriment of other most appropriate techniques to capture the aggregation of collective actors and the division of classes. Thus, the criticism was double, assimilating the research strategy to a conservative ideology (J.H. Goldthorpe, C. Llewellin, and C. Payne). Certainly, this division was not the exclusive privilege of the area of studies of social mobility, but rather impregnated the almost totality of the sociological debate in the decades between the fifties and the seventies. Although at the present time they are remnants of this extreme polarization, it is not risky to affirm that the majority of the confrontations have been considerably reduced to the point where a great part of the production of knowledge currently takes place on certain bases of confluence and complementarity between the two perspectives. Some empirical works such as those carried out mainly by Goldthorpe in England about the working class, and other theorists among which the valuable contribution of A. Przeworski stands out, contributed to displace the debate from the purely ideological field.

a. The first studies on stratification and social mobility

According to (Filgueira, C., 2001) it is possible to distinguish three large nuclei of knowledge that can order the analysis according to the conventional conceptualization of the types of mobility:

1. one related to structural mobility,
2. the second, to replacement or individual mobility,
3. and the third, to marginality (urban, rural).

a.1. Structural Mobility

Filgueira, C., 2001, considers that the first studies on structural mobility carried out by analysts in Latin America accurately recorded the positive effects of economic and

productive development on social mobility. Effects that lasted throughout the past century and in particular, during the postwar period. The secular trends in the reduction of the rural sector due to the effects of rural-urban migration, the fall in employment in the primary sector, the process of industrialization that with greater or lesser depth -either earlier or later- affected the largest part of the countries of the region, urbanization, the increasing degree of salarization (earning a salary) of the economically active population (EAP) and the expansion of the educational system at all levels, were all processes that encouraged upward social mobility and this was the case of the time[13]

It is not necessary to resort to historiography to remember that the postwar period was a golden period of a golden century of world capitalism. In Latin America, it acquired a particular characteristic by being based on the model of import substitution or inward development whose most significant expression was the formation of a protected industry with dynamic effects on the social structure in several ways: the formation of an industrial proletariat, the emergence of the dependent middle class sectors, and the formation of a labor market where the capitalist contractual forms expanded. For the great majority of the countries of the region, the post-war period corresponded to the second industrialization that would come to breathe new dynamism into the growth of the manufacturing industry that began in the beginning of the century in some cases. But the literature of the time also adequately recorded other sources from which the dynamism came. It showed conclusively that in addition to industrialization there were two other drivers of change and upward mobility; one, constituted by the incipient development of the service sector in general, and the second, due to the extraordinary growth of the state apparatuses, of the public administrative bureaucracy, of the state productive enterprises, as well as, encouraged by the expansion of the systems of public education and health, and by the development of the bureaucratic apparatuses in charge of the administration of social security (Filgueira, C., 2001).

13 For Filgueira, C., 2001, there are another studies, such as: Germani G., "La movilidad social en la Argentina" in Política y Sociedad en una época en Transición, Ed. Paidós, B. Aires, 1971; Costa Pinto E., "Social Stratification in Brazil: A General Survey of some recent Changes", Third World Congress of Sociology, Amsterdam, 1956; from the same author, "Estratificaçao social e desenvolvimento económico", Boletim do Centro Latinoamericano de Pesquisas em Ciencias Sociais, V.2, No. 3, Rio de Janeiro, 1959; Hutchinson B., "Social Mobility Rates in Buenos Aires, Montevideo and Sao Paulo: a Preliminary Comparison, América Latina, Año V, 1962; Solari A., "Las clases sociales y su gravitación en la estructura politica y social del Uruguay, Rev.Mex.Soc. 18(2), México 1956. Solari A., y Labbens J., Movilidad social en Montevideo, Boletim do Centro Latino-Americano de Pesquisas em Ciencias Sociais, 4(4), Rio de Janeiro, 1961. Gibbs J. y Browning H., "The Division of Labor and the Organization of Production in twelve Countries", American Sociological Review, Vol 31, No. 1, 1966; Kahl J.A., La industrialización en América Latina, Fondo de Cultura Económica, México, 1965. Iutaka S., "Social Stratification research in Latin America", Latin America Research Review, Vol 1, No.1, 1965. Chaplin D., "Peruvian social mobility : revolutionary and developmental potential", Journal of Interamerican Studies and World Affairs, Vol. 10, No. 4, 1968; Bresser Pereira L.C., "The rise of Middle Class in Brazil" en Horowitz L.L., (Ed) Revolution in Brazil. Politics and Society in a Developing Nation, Dutton & Co. Inc, N. York, 1964. Whetten N., "El surgimiento de una clase media en México", en AA.VV, Las Clases Sociales en México, Ed. Col.Tlapali, México, 1963.

The second long-term structural process that encouraged upward mobility was given by changes in demographic patterns. To the extent that the middle and upper classes began to reduce fertility before the lower urban and rural sectors, a relative void was created in the reproduction of the population of the highest sectors of society. This favored that the children of parents of low social origin occupied occupational positions that could not be filled by the number of children belonging to the highest strata. A golden period is also identifiable here, from which the demographic transition in its initial and intermediate stages has the effect of stimulating social mobility. During the 1960s, a few countries in the region were already in the advanced stages of the demographic transition, although most of them were only in their infancy. The demographic effects, therefore, continued to be felt during the subsequent decades, especially in the immediate two and its consequences, although attenuated, continue to have some effect especially in the countries in the most lagging stages of the demographic transition, although we do not know at present its real magnitude[14]. In fact, the productive transformations in conjunction with the demographic mobility induced by fertility differences between strata, acted virtually as a pump suction contributing to stimulate an exceptional upward mobility in most of the countries of the region. This process occurred with greater depth and antecedence in countries such as Uruguay, Argentina and partially in Chile, as latecomers of the industrialization process, whose trajectory did not seem so spectacular because it lasted throughout the first half of the last century, although most of the countries in the region were not alien to it (Filgueira, C., 2001). However, it was with the second industrialization that the consequences of structural changes on social mobility became more visible. Thus, for example, the studies on Brazil for the year 1973 showed the extraordinary effect of changes in the productive structure on upward inter-generational social mobility. Few countries, if any, have gone through their historical trajectory through such a favorable phase. Pastore (1979) showed that the rate of general social mobility in Brazil in the early 70s recorded almost 60 percent of mobile individuals with respect to their parents in the occupational scale, with 47 percent having experienced upward mobility.[15]

In other words, for the entire population examined, within mobile individuals, 80.6 percent had ascended while only the remaining 19.4 percent had ascended. The generation of employment favored the rapid consolidation of the new dependent upper and middle classes (wage earners) associated with the processes of industrialization, modernization of the state and urbanization, as well as giving rise to a modern urban proletariat that would extend beyond the confines of the city of San Pablo. In the inter-census period 1950-1970, about a total EAP of approximately 16 million people at the beginning of the period and 29 million at the end, three and a half million jobs were created in medium and high occupations in the tertiary sector (professionals , entrepreneurs, managers, administrators, clerical employees and in the commerce sector, in addition to other activities of type white collar) and a similar number of industrial occupations of manual level, at the expense of a

14 There is no proportion between the attention that the literature of the time lent predominantly to the study of mobility induced by productive changes in relation to demographic changes. On this last aspect, see Filgueira C.H. and Geneletti C., op. cit. 1981.

15 Pastore J., Desigualdade e Mobilidade Social no Brasil, Editorial Universidade de Sao Paulo, 1979.

much smaller growth of the low occupations in the primary sector (Filgueira, CH 1984[16]). This was in good account, a part of the reality studied by the analysts of stratification and social mobility until the 1970s[17].

a.2. Structural change: the installation of urban and rural marginality

Filgueira, C. (2001) mentions that at the same time that these mechanisms of social ascent operated, the studies of the time were also in charge of showing the problematic side of structural change. Not all immigrants of rural origin and not all children born in urban households of low social status with high fertility easily found their place in the urban labor market. With the increase in urbanization, the literature of the period recorded the growth of the peripheral urban poverty belts, populations, callampas, cantegriles (precarious housing), or villas misery, which manifested as the most visible consequence of a limited social integration, of insufficient dynamism of the labor market to absorb the immigrant population, with the consequence of problems caused by precarious employment and informality, open unemployment or underemployment, which were added to the restricted access to the educational system and health, and to the limitations to the full exercise of political citizenship Thus, it was no coincidence that in this period, for the first time in the region, the subject of marginality began to be discussed and gained notoriety.

This other face that contrasts with "easy mobility" was observed in the same example of Brazil in the 70s. While the expansion of middle and high occupations had the effects indicated above on upward mobility, the occupations that grew most relatively in the 20-year period they were those corresponding to those with the lowest qualification in the tertiary and service sectors. While the general EAP increased by 1.8 in two

16 This means, for example, that high occupations multiplied by almost 2.5 in a period of twenty years and the low strata in the secondary sector did it by 2.0. See, Filgueira C.H., "Estructura y Cambio Social: tendencias recientes en Argentina, Brasil y Uruguay", en Revista Pensamiento Iberoamericano, No.6, Madrid, España. (1984)

17 A second generation of work on stratification and mobility in Latin America can be recognized, especially during the 70s, composed among others by the following papers: Balan J., Browning Y. y Jelín E., Migración, estructura ocupacional y movilidad social: el caso de Monterrey, Instituto de Investigaciones sociales, UNAM, 1973; Raczinsky D., Posición Socioeconómica y Consistencia de Status de las Ocupaciones, Santiago de Chile, 1971, de la misma autora, "La Estratificación Ocupacional en Chile" en Los actores de la realidad chilena, Ed. del Pacífico, Santiago, 1974; Muñoz H., de Oliveira O. y Stern C., Migración y Desigualdad Social en la Ciudad de México, UNAM- Colegio de México, 1977; Llach J.J., "Estructura Ocupacional y dinámica del Empleo en la Argentina, Revista Desarrollo Económico, Vol 17, No. 68, 1978; Beccaria L.A., "Una contribución al estudio de la movilidad social en la Argentina. análisis de los resultados de una encuesta para el Gran Buenos Aires", en Revista Desarrollo Económico, Vol 2, 1978; Filgueira C. H., Expansión Educacional y Estratificación Social en América Latina, CEPAL, B. Aires, 1976; Filgueira C. H. y Geneletti C., Estratificación y Movilidad Ocupacional en América Latina, CEPAL, Santiago de Chile, 1981, además de los trabajos posteriores a la década de los 60 de Germani G. (UBA) y Solari A. (CEPAL)., y parte de la producción sobre el tema realizada en Brasil citada en una nota aparte (Filgueira, C., 2001).

decades, these occupations multiplied almost four times, from 830,000 to more than three million. Although in the 70s, the relative proportion of the population employed in these conditions was not very high in relation to the total EAP, both in Brazil and in most of the countries of the region, what the studies of the era were registering was a process that was only in its initial phase and that later would become one of the characteristic features of the urban social structure of the region in the following decades (Filgueira, C., 2001).

a.3. The two spheres of mobility

For Filgueira, C. (2001) the second problematic aspect that the investigations showed was the behavior of the mobility called indistinctly as individual, circulation or replacement. The optimistic vision that emerged from the results of structural mobility also had another face when examining the intrinsic processes of mobility in the social structure without considering -or controlling- the movements induced by productive or demographic change.

To the extent that the type of individual mobility is the one that most appropriately qualifies the degree of openness of the social structure to reward successful performance or failure to compete for access to the highest or best evaluated social positions. The amount of mobility in societies becomes an important indicator of what has been called the degree of "permeability" of the social structure. The more rigid or stationary a stratified system is, the lower the probability that there is mobility by replacement and, consequently, the lower is also the probability that occupational positions are occupied according to qualifications and performance capacity.

In the extreme case, mobility tends to be null when, for example, the social positions occupied by a new generation come exclusively from the family origin or from assigned factors. Or what is the same, when the destiny of a person is determined from his birth. In this extreme case, the redistribution of power and prestige in society would not take place. The research carried out in the period provided a diversity of works whose conclusions confirmed the problematic side of individual mobility. The two studies referred to on Brazil, by way of example, both that of N. do Valle Silva and J. Pastore, highlighted the contradictions of modernization expressed by the tension between change and continuity. When the authors examine the behavior of mobility under the hypothesis of zero structural mobility, the resulting scenario is entirely different from the one derived from global mobility. Brazil appears as a society characterized by three features (Filgueira, C., 2001):

a. An upward mobility that is considerably low and much lower than the mobility induced by changes in the structure (the upward mobility of "circulation" only falls by a third part),
b. The distances of mobility, between points of the occupational scale, tend to be reduced to movements between contiguous positions (mobility of short stretches) and,
c. the movements of ascent and descent are fragmented into two occupational groups constituted respectively by high and low occupations (mobility blocked for the lower sectors).

If structural transformations did not occur, the picture of social stratification and occupational mobility in Brazil in the early 1970s corresponded to a society with a very low degree of "permeability" and low chances of upward mobility. Although the overall upward mobility in Brazil was only surpassed by the United States according to the comparative studies of the period, this position became the most unfavorable when comparing the circulation or individual mobility with other countries such as the United Kingdom. , Germany, Yugoslavia, Argentina or Italy. Already the studies carried out during the decade of the 60s had shown this pattern, especially in the comparison of Brazil with Argentina and Uruguay.

The greater amount of mobility in these two countries -which had previously made their main structural transformation process- was attributed to the mobility of "circulation" and to a greater permeability of the social structure. In other words, relatively more open societies compared to the rest of the region. In Brazil, on the other hand, everything indicated that mobility should be attributed to a process of expansion of the occupational structure and not to a better use of existing positions (Pastore, 1979). The high global rates of upward mobility concealed a rigidity of the social structure in terms of "permeability" that would be felt in a critical way insofar as the structural and demographic processes of induction of upward social mobility tended to be canceled (Filgueira, C., 2001).

On the other hand, the academic literature relates social mobility within a context structured by class, for the case of the present investigation, this conceptualization includes the quantification of the displacements along a stratification demarcated by income (high, low middle), verifying how these movements occur in time and between strata, with explanations of their determinants and diverse implications, in terms of growth, poverty and inequality.

Some authors relate social mobility, with intergenerational linkage, either of income or training, such is the case of Burtless and Jencks (2003), who investigate in this type of links, finding that social mobility reduces over time, since it is easier for wealthy parents to provide their children with educational advantages, in relation to poor parents who have precarious spending, and even more so when it comes to investing in human capital of their children.

Solon (2004), argues, and mentions that intergenerational transmission from parents to children can be undetermined, and the variant that can make the difference has to do with the advantage that the lower and middle classes can take from public educational programs, and private spending, which is not always associated with high returns of the upper class.

Durlauf (1996), relates that high inequality and high poverty could reduce social mobility, since these could generate greater segregation between lines of income (or income quintiles), generating adverse effects among peers from the same stratum, even more so in the low income strata.

For the Bolivian case, Andersen (2003) quantifies social mobility from cross-sectional estimates, using household surveys, finding that Bolivia, in relative terms, would have low social mobility, its explanation is found in: Differentiation of educational quality between the public and private schools, the high degree of selective matching and the insufficient urban-rural migration. For the case of research, it is possible to understand consistency in its calculation, with the first part of the series analyzed, with a characterization of low

growth, high poverty and inequality, which since the nineties remained almost unchanged, and low social mobility for the Bolivian case, in the comparison of results in Latin America.

Gray Molina, G.; Yáñez E.; Casanovas, L.; Espinoza, P. Loayza, N. (2007)[18] analyze the processes of stratification, social mobility and ethnicity in Bolivia, with a comparative vision with respect to other countries of the Andean region. They identify that the demographic, labor and international insertion changes had an effect as intense as that caused by the change in the development paradigm, which came with the first and second generation stabilization, structural adjustment and reformism programs. The authors identify three characteristics related to social stratification processes. First, they point out that there have been significant socioeconomic changes that shape the structure of opportunities for individuals and groups, due to: i) an accelerated urbanization process, which transformed Bolivia from a predominantly rural country in the 1970s to an urban one at the present time ; ii) a marked process of tertiarization of the economy, after the collapse of tin in the eighties; and iii) a new geographic and spatial configuration, which favors the emergence of metropolitan areas in the cities of the central axis of the country (La Paz-El Alto, Cochabamba, Santa Cruz) and the development of new intermediate cities and larger rural populations in the North-South and East-West axes of the country.

Gray Molina, G.; Yáñez E.; Casanovas, L.; Espinoza, P. Loayza, N. (2007) identify that due to changes in the structure of opportunities, significant transformations in the socio-occupational structure are observed. The proportion of small rural producers, including peasant, indigenous (plains) and native (high) communities, decreases, and the weight of self-employed workers and precarious workers linked to the commerce, services and construction sectors increases in the cities of the central axis of the country. This phenomenon implies for the authors a significant increase in female labor participation and paid labor participation of adolescents and young people. Finally, they show that there is low social mobility among socio-occupational groups and high mobility within groups segmented by ethnic-linguistic condition, which is explained by the intergenerational changes in Bolivia: a greater linguistic loss among first or second-generation migrant groups generation that make up the new Bolivian urban population, accompanied by an affirmation of the Aymara or Quechua identity in these groups. For the authors, the new urban Indians have a greater endowment of human capital assets and better possibilities of labor insertion than the former rural Indians, allowing greater social mobility within groups classified by their linguistic ethnic condition, but relatively little intergenerational social mobility with respect to the Bolivian population as a whole.

Vera (2005) finds the relationship between poverty, inequality and its possible implications for social mobility, in the context of Vera's research, relates high inequality in the capacity to generate employment and income, with a precarious growth, which

18 Gray Molina, G.; Yáñez E.; Casanovas, L.; Espinoza, P. Loayza, N. (2007). Estratificación, movilidad social y etnicidad en Bolivia. En: Estratificación y movilidad social en América Latina. Transformaciones estructurales de un cuarto de siglo. Rolando Franco, Arturo León, Raúl Atria (coordinadores). Primera edición. Santiago: LOM Ediciones, 2007. R.P.I.: 163.484 ISBN: 978-956-282-900-7.

does not help decrease poverty rates and help transform the pattern of social and political development. Vera's review is also consistent with the present investigation, at the time it was made.

The National Report on Human Development in Bolivia (2010): The changes behind the change, Inequalities and social mobility in Bolivia, establishes that Bolivian society is not immobile, portrays the transformation of Bolivian society, of long and short duration, which modified the demographic, political, social and cultural profile of Bolivia. They account for many changes, especially an expansion of the exercise of rights to education and health, and the participation of traditionally excluded sectors, especially indigenous peoples, in the exercise of political power. The report analyzes the survival and accumulation strategies adopted by the Bolivian population during the last three decades, and characterizes the processes of individual and collective mobility, originated in many cases outside the State. It portrays a social change in construction in which historical inequalities persist -of ethnic origin, of gender, and between urban and rural areas-, to which are added new inequalities resulting from a segmented labor market and new urban identities based on styles of life. These inequalities slow development and limit coexistence because they are reproduced in a context of high poverty and produce practices of exclusion and discrimination. At the same time, they pose new challenges for action.

3. Methodology for the estimation of Social Mobility, 1996-2016

There are several alternatives to estimate social mobility, and with them the limitations that imply its calculation. Many of these limitations include the lack of clarity in the conceptualization that allows the operationalization of its calculation and that it be comparable over time and between countries, and second with the source of the data, which, when referring mobility, requires achieving a panel, which allows monitoring of the data of the same observational units over time. A plausible strategy against the two limitations referred to above is the one applied by Bjoklund and Jantti (2007); Grawe (2011); Leigh (2014), who quantify social mobility using proxies as the ratio of estimated income of parents and children, by age cohorts, using this guideline, will quantify an indicator of social mobility for the Bolivian case.

The empirical strategy includes using the data from household surveys, considering the economically active population that, within its members, it is possible to have information from parents and children, however, the great limitation of achieving follow-up over time, is that it should be achieved to achieve the same data for each year (panel), presuming that they live in the same home immovably, supposedly unrealistic. To achieve the monitoring over time, what is sought is that with the income and occupation information of parents in period t, an estimate is made with the logarithm of the hourly wage of each individual $Y_{i,j}$, where i represents individuals y_j occupation, and a vector of covariates $X_{i,j}$, that allow to see individuals with similar characteristics over time, based on observable variables, and a quadratic variable of age Ai is added, having the following specification:

$$Y_{i,j} = \theta_j X_{i,j} + A_i + A_i^2 + e_i \quad (1)$$

The income of parents in occupation j is predicted as those of a person with 40 years in occupation j, algebraically composed as A = 40 and $Y_f = j = Y_j$. The relationship between children and parents is estimated, with the logarithm of the hourly wage and the logarithms of the prediction of the father's wages per hour, having:

$$Y_{sj} = \alpha + \beta \hat{Y}_{f=j} + A_i + A_i^2 + e_i \quad (2)$$

Each specification is developed separately for each cross-sectional sample, obtaining that the coefficient β of equation (2) is the proportional change of the wages of the child with a link to the antecedent of the father's wages. To achieve the quantification of social mobility, the variations of income between periods are calculated, having the ratio of the standard deviation between generations of $\rho = \beta (\sigma f / \sigma s)$.

To verify social mobility, the methodology of Dang et al. (2014) will be used, which allows to see the probability of changes, between periods, of strata, which, in a certain way, illustrates the changes that can explain the trend in the time between low, medium and high income strata. A first element to achieve stratification will be the delimitation of thresholds, to estimate individually the belonging to a stratum at each moment of time, achieving the following groups, having:

$$\text{Prob}\ (\rho_{i2} > c \wedge \rho_{i1} > c) \quad (3)$$

Where ρ_{it} represents the individual probability of being part of an income stratum in period t and its ascent to the upper immediate stratum, the following group will be:

$$\text{Prob}\ (\rho_{i2} < c \wedge \rho_{i1} < c) \quad (4)$$

Showing the change between one stratum and another, but in descent, the other groups will be:

$$\text{Prob}\ (\rho_{i2} > c \wedge \rho_{i1} < c) \quad (5)$$

and

$$\text{Prob}\ (\rho_{i2} < c \wedge \rho_{i1} > c) \quad (6)$$

It would have been possible to generate income limits, such as quintiles, deciles, or any convenient categorization; however, calculating the probability of belonging to one stratum or another, provides a non-exogenous element that does not require re-parameterization, as adjustment for purchasing power, or similar, but verifies the distribution according to the observable characteristics of the set of samples based on the collection of cross-sectional data. To operationalize the aforementioned delimitation of strata, cut points are given, in which it is possible to replicate the distributions over time with the data from the household surveys, having:

$$k_1 < \text{Prob}\ (\rho_{i2} > c \wedge \rho_{i1} > c) < k_2;\ k \in [k_1, k_2] \quad (7)$$

$$m_1 < \text{Prob}\ (\rho_{i2} < c \wedge \rho_{i1} < c) < m_2;\ m \in [m_1, m_2] \quad (8)$$

$$g_1 < \text{Prob}\ (\rho_{i2} < c \wedge \rho_{i1} > c) < g_2;\ g \in [g_1, g_2] \quad (9)$$

$$n_1 < \text{Prob}\ (\rho_{i2} > c \wedge \rho_{i1} < c) < n_2;\ n \in [n_1, n_2] \quad (10)$$

Where k, m, g y n, are proportions of income delimitation demarcated by the Organization for Economic Cooperation and Development (OECD), having the lowest income class contains individuals with an income lower than 50% of the median of the total population, the middle class includes all individuals with a net income comprised between 50 and 150 percent of the median income, the upper class of income identifies all individuals with an income greater than 150 percent of the median income.

3.1. Household surveys as a primary source of data

The source of the data used for the present investigation is household surveys. Household surveys are the most flexible of the data collection instruments from which it is possible to extrapolate a wide variety of topics. Another important advantage of household surveys is that, through an adequate design, it can cover virtually the entire population of the country, as well as all branches of economic activity, all population strata including the urban and rural population, and depending on the amount of sample planned by geographic stratum, it is possible to achieve geographical representation in greater detail[19]. Household surveys are also the only source of data that allows the joint and mutually exclusive measurement of people with different socioeconomic characteristics over time. Household surveys have as basic units of sampling households, but as units of analysis the individual, therefore, can be collated with other supplementary information obtained from the same survey. As a background of the databases, it is important to point out that since 1978 the National Institute of Statistics of Bolivia (INE) has been carrying out four different types of surveys:

1. The Permanent Household Surveys (eph),
2. the Integrated Household Surveys (eih),
3. the National Employment Surveys (ene) and,
4. surveys of Measurement of Living Conditions (mecovi). The last ones have been applied in the years 1999, 2000, 2001, 2002, 2003-2004, 2005, 2006, 2007, 2008 and 2009, 2011, 2012, 2013, 2014, 2015 and 201620; and they constitute the most current, and most extensive, series of information on the living conditions of households.

19 Household surveys, from 2011 to 2016, achieve representativeness at the departmental level.

20 All the Mecovi Surveys 1999 - 2002, the Continuous Household Survey 2003-2004, as well as the Household Surveys from 2004 onwards, are available on the official web portal of the National Institute of Statistics. - Bolivia www.ine.gob.bo

For this document, a combination of cross-sectional data from ENE, 96 and 97, and household surveys will be used, leaving aside the information from the Continuous Household Survey 2003-2004, because the characteristics of this source of data pursue other objectives different from the one that this research[21] requires, and ignoring the years 1998, and 2010, years in which information is not available. Cross-sectional combinations of different years are usually an effective means to analyze the national situation and the changes in macroeconomic and microeconomic impacts resulting from the policy guidelines and socio-economic changes given in the country. Given that the questions and the sample design change from survey to survey, all of them were homogenized, in variables, nomenclature and categorization, achieving comparability between years, generating a differentiated expansion factor for years that considers the information of population growth projections of the population from the 2012 National Population and Housing Census (CNPV) in order to extrapolate the results of the sample to the population. It will be noted that the compiled base generates results for years as if they were differentiated groups within the same survey, but when using expansion factors with different sample weights per year, the results are quite consistent and for its verification is that when the case is presented, the sampling errors of the treated indicators are showed.

4. Bolivia: Social mobility, growth, poverty and inequality

The methodological strategy of mobility analysis is oriented to obtain empirical evidence from the construction of a first panel:

- First, with data on the rate of change of the product as a proxy for the growth of the economy, to identify the boom cycle of raw materials in the study period (1996-2016), divided into two ex ante time periods (1996-2006) during (2006-2013) and ex post (2013-2016).
- Second, based on household surveys and using conventional estimates and measures, estimate disaggregated levels of poverty, be it moderate or extreme poverty and geographical location at the rural or urban levels.
- Third, Household surveys also allow us to establish inequality measures based on the estimation of Gini coefficients, but also other measures such as Atkinson, Theil and Entropias. In this sense, we present the first data in Graph 1 detailed below:

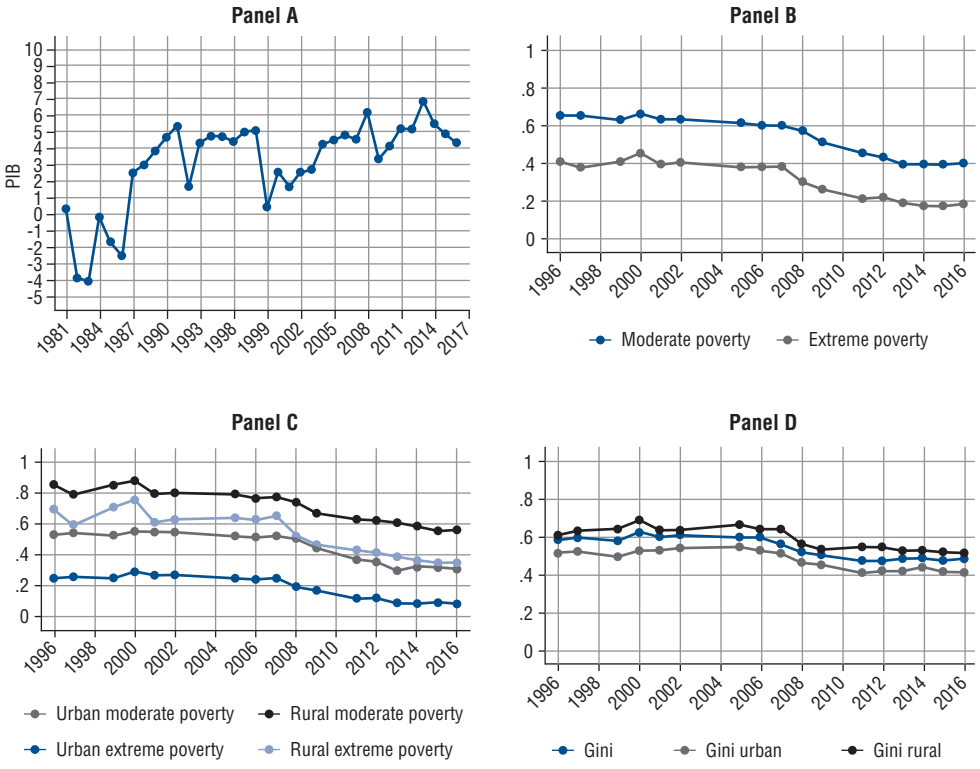
  a. Panel A: Rate of product variation as a proxy for economic growth.
  b. Panel B: Moderate and extreme poverty.
  c. Panel C: Poverty by geographic area at urban and rural level.
  d. Panel D: Inequality by geographic area at urban and rural level.

21 One of the main uses given to the Continuous Household Survey 2003-2004 is to establish consumption patterns that allow monitoring of consumer price indices, an input necessary to calculate basic food and non-food baskets, such as it was explained in the theoretical section. In this research, this source was used when constructing poverty lines, but not when looking at indicators of poverty and inequality.

a. Panel A, Economic growth

The Bolivian economy has an extreme and historical dependence on raw materials, in the Republic this dependence was with respect to minerals specifically tin (until 1985) and from the second half of 2005, gas, which determined an income boom between 2006 In 2014, the hydrocarbon sector became one of the most important for the Bolivian economy in the last period, due to the export of natural gas to Brazil and Argentina.

Graph 1
Bolivia, growth, poverty, inequality



Source: National Institute of Statistics (National Employment Survey, November 1996 and 1997, Household Survey - Measurement of Living Conditions Program, November - December 1999, 2000, 2001 and 2002 and Survey of Households 2003-2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012, 2013, 2014, 2015 and 2016).
Elaboration: Own.

For Morales, Juan Antonio (2018)[22] the macroeconomic crisis of the first five years of the eighties produced a deep fall in GDP per capita, which lasted until the decade

22 Morales, Juan Antonio. (2018). Bolivia y los grandes ciclos históricos en los siglos XX y XXI. En: Un siglo de Economía en Bolivia 1900-2015. Tópicos de Historia Económica. Fundación Konrad Adenauer (KAS). Plural Editores. ISBN: 978-99954-1-852-6.

of the nineties. The recovery of the economy was not as vigorous as would have been expected after the collapse of the 1980s. In the period 1986-2005 the annual growth rate of GDP per capita was 1.1 percent, with a very small variance. Morales, Juan Antonio (2018) found that in 15 of the 20 years of that historical cycle it grew below the long-term trend, calculated according to the Hodrick-Preston technique. It also considers that the period 2006-2015 would have to wait for the economy to become dynamic. The GDP per capita increased in that period to a respectable rate of 3.4 percent and this rate was almost uniform throughout the period, as evidenced by the small variance following the Hodrick - Preston methodology. For Morales Juan Antonio (2018) to maintain this rate, GDP per capita would double every 16.5 years. Surprisingly, highlights Juan Antonio Morales (2018) in the period 2006-2015 there were four years of growth below the trend, calculated by the technique of Hodrick-Preston.

For Grebe, Horst (2018)[23] between 2003 and 2014 the economy recorded an exceptional period of bonanza, between 2003 and 2014 the Bolivian economy went through an exceptional period of bonanza, which has so far facilitated the implementation of the economic policy of redistribution of income for the benefit of the less favored sectors, applied since 2006 by the Government of Evo Morales. Bolivia received according to the Ministry of Economy (2017) for the sale of gas in the period 2006-2016, more than 40 billion dollars, with a maximum of 6.674 million in 2014 and a minimum of 2.060 million in 2006, the bonanza was it was due specifically to an external environment of highly favorable prices.

Main reasons for the bonanza and the significant flow of income

1. The first important measure for the new income configuration for the Bolivian economy was the nationalization[24] of hydrocarbons, in 2006. According to Grebe,

23 Grebe, Horst. (2018). The cycles of the world economy and the development of Bolivia. In: A Century of Economics in Bolivia 1900-2015. Topics of Economic History. Konrad Adenauer Foundation (KAS). Plural Publishers. ISBN: 978-99954-1-852-6.

24 In economic jargon, Statute or "Nationalization" is the process by which the State appropriates or becomes the owner or controller of goods or activities that until now belonged to the private sphere. In this way, a means of production or exploitation ceases to belong to private companies to be under the control of a government in question. The opposite phenomenon by definition to nationalization is privatization. In Bolivia between 2005 and 2016, the nationalizations began on May 1, 2006, in that year the government decreed the nationalization of hydrocarbons and ordered the oil companies to choose between signing new contracts within a period of 180 days or leave the country. The Nationalization of hydrocarbons was given from the Supreme Decree (D.S.) "Héroes del Chaco", D.S. Nº 28701, dated May 1, 2006, as of that decree, a dozen multinational companies that worked in the country in the hydrocarbons chain subscribed, six months later, 44 contracts with the restructured state-owned company, Yacimientos Petrolíferos Fiscales Bolivianos (YPFB) and, among other things, it was agreed to pay a tax on the value of production between 50 and 85 percent. From the Nationalization: First, hydrocarbons according to the administration of President Morales, are owned by the Bolivian people, through the State. Second, YPFB is re-founded that, on behalf of the State, controls, directs and operates all the activities of the hydrocarbon chain. Third, the State defines the generation, use and destination of

H. (2018) the nationalization measures of the strategic sectors and in particular hydrocarbons, have meaning the state capture of surplus, which under the circumstances of the previous economic model would have been appropriate by transnational corporations. The combination of government change in Bolivia and Brazil facilitated the renegotiation of gas sales contracts under extremely favorable conditions, which allowed for an extraordinary increase in foreign exchange and tax revenues, the price effect also played a starring role, the increase in oil price, directly increased the sale price of gas.

2. Added to them also the favorable external context that promoted the growth of the product, due to this, the increase in the prices of minerals, as well as the exports of soybeans and their derivatives. This meant a significant increase in fiscal revenues that experienced an upward dynamic and a budget surplus and accumulation of Net International Reserves (NIR). According to the methodology used by the World Bank,

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the economic surplus of hydrocarbons. Fourth, the supply of the domestic market and the fulfillment of commitments with external markets are guaranteed. Fifth, the State defines prices in the domestic market and conditions of export contracts. Sixth, projects are carried out that will make objective the main aspiration of Bolivia, which is the industrialization of Natural Gas. Since 2006, a score of companies have been nationalized by the administration of President Morales, including five other subsidiaries of the Spanish companies of Red Eléctrica and Iberdrola. Likewise, in May 2006, in the mining sector, the nationalization allowed the control of the privatized tin mine in Huanuni to be transferred to the state, and in February 2007, that of the Vinto foundry company, which was under Swiss investment. In May 2008, the administration of President Morales took another step in the control of hydrocarbons with the nationalization of the logistics and storage company CLHB, until then in Peruvian and German hands, and the transporter of hydrocarbons, Transredes, administered by the British company Ashmore and the Anglo-Dutch company, Shell. Also in that same month, it reached an agreement with Repsol YPF that allowed the State to recover most of the shares of its subsidiary Andina, with a shared management, and on the other hand nationalized: the Entel telephone, a subsidiary of the Italian Telecom. In January 2009, President Morales completed the nationalization of hydrocarbons with the intervention of the Chaco company, owned by the British British Petroleum (BP) and the Argentine Bridas, which he accused of having removed USD 277 million from the country. In May of that same year Air BP, also a subsidiary of the British British Petroleum, dedicated to the distribution of fuel at airports, was nationalized. In 2010 four electric companies were nationalized, one of them (Corani) subsidiary of the French GDF Suez and another (Guaracachi) of the British Rurelec PLC, in addition to the Bolivian Valle Hermoso and Empresa de Luz and Fuerza Eléctrica de Cochabamba. In the same year, the small antimony smelter Metalúrgica Vinto-Antimonio, a subsidiary of the Swiss company Glencore, was nationalized and had ceased to operate in recent years. Also on May 1, the administration of President Morales expropriated Red Eléctrica shares in Transportadora de Electricidad, in December 2010 it was decreed the expropriation to Iberdrola of two electricity distributors in the regions of La Paz and Oruro, a company of services and an investment manager. Finally, on February 18, 2013 the Spanish company Servicios de Aeropuertos Bolivianos (Sabsa) was nationalized, therefore, the administration of President Morales reaffirmed a policy of state control of the strategic sectors at the national level, these measures allowed the appropriation of the surplus and exponentially increased the tax revenues of the Bolivian economy.

the bonanza allowed Bolivia to move from low income to a country with low-middle income.

3. In addition, remittances (transfers) from abroad of Bolivian migrants abroad increased the country's income, which increased by 26 percent in 10 years, according to the Central Bank of Bolivia (BCB, 2018) between In 2007 and 2017, the value of remittances that entered Bolivia increased by 26.37 percent, in 2017, the money sent from abroad, reached USD 1,289.4 million, the highest figure in the last 10 years. On the other hand, remittances in 2007 registered USD 1,025.5 million. 2010 is recorded as the year with the lowest amount of remittances received in the boom period with USD 983.3 million. The country where Bolivian migrants sent the most money to Bolivia is Spain, which represented 33.8 percent of total remittances, followed by the United States (17 percent), Argentina (13.1 percent), Brazil (10.4 percent) and Chile (9.5 percent). Remittances came mainly to the departments of Santa Cruz, Cochabamba and La Paz, according to the BCB. Although Spain is the country where most money is sent to Bolivia, this is not the country with the most Bolivian immigrants. According to information from the 2012 Population and Housing Census, published in 2014, the country with the most Bolivian immigrants is Argentina, with 187,254; followed by Spain with 116,732; Brazil, 64,675; Chile, 29,081, and the United States, 20,610.
4. The cancellation of the debt due to the renegotiation with the different relief programs since the 90s also meant slack of income and elimination of the budgetary restriction of payment of debt and allowed with that important amount of money to allocate it to relief and reduction programs of poverty since 2006. According to Pacheco, N. (2018[25]) the renegotiation and elimination of debt occurred in response to the criticism and pressure of several industrialized countries for the high amounts of debt of poor countries, in 2005, in Scotland, the G8 approved the cancellation of 100 percent of the debt stock of the HIPC countries (debts with the IMF and the World Bank to which the IDB joined). Program called Multilateral Debt Relief Initiative (Multilateral Debt Relief Initiative). The purpose of this new reduction was to achieve the Millennium Development Goals in 2015. The new program began to be applied between 2006 and 2007, with a total of USD 2,734 million, equivalent to 55.3 percent of the debt balance, being forgiven to Bolivia external debt. This explains the reduction in the balance between 2006 and 2007. However, according to Pacheco, N. (2017) since 2008 the authorities again hired loans and the external debt especially in 2012 and 2013 increased, for example when Sovereign Bonds were placed in abroad for a total of USD 1,000 million.

In the 2006-2014 boom period, on average, 90 percent of the country's exports were concentrated in three sectors: hydrocarbons (45 percent), minerals (35 percent) and agro

25 Pacheco, Napoleón. (2018). Deuda externa Bolivia: Los ciclos de auge en los precios de los productos de exportación y los ciclos de endeudamiento externo en el siglo XX e inicios del siglo XXI: 1900-2015. En: Un siglo de Economía en Bolivia 1900-2015. Tópicos de Historia Económica. Fundación Konrad Adenauer (KAS). Plural Editores. ISBN: 978-99954-1-852-6.

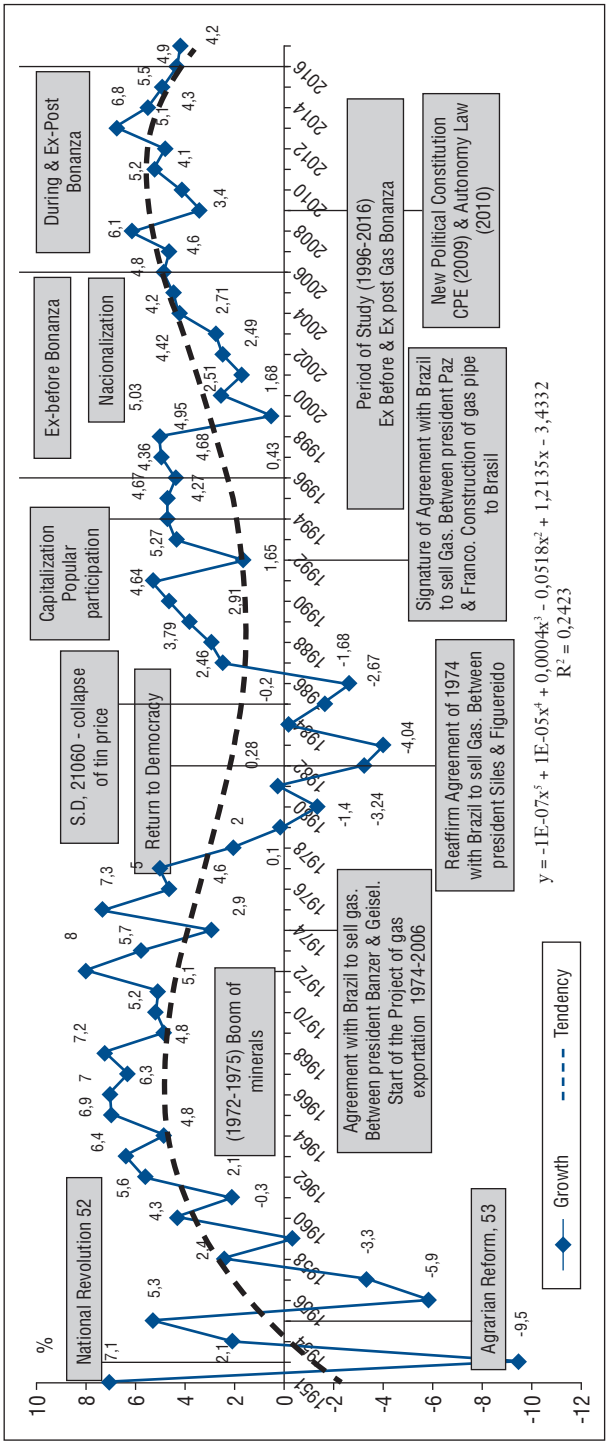
industrial (10 percent). In the first sector, Brazil is the main destination together with Argentina, which are the only markets and destination markets for gas exports, with 37 percent; followed by Argentina, with 8 percent. In the second sector, the United States, Japan, Belgium, South Korea, China and Switzerland represent the main destination markets for the Bolivian mineral basket. In the case of agro-industry, quinoa purchased by Peru and re-exported by it to the United States and Europe represented an average of 5 percent, and soybean destined for Venezuela and Colombia reached 8 percent. Undoubtedly, the dependence of the generation of income for the Bolivian economy of only raw materials makes it vulnerable and dependent on the variation of commodity prices at the international level, generate Dutch disease for the Bolivian economy and in an economy where there is a large informal sector and smuggling products, foreign exchange output abroad.

Graph 1 shows the trend of the growth rate of the last 67 years, where it is possible to see the oscillatory movement characteristic of economic cycles, which for the Bolivian economy have been subject only to the international prices of the raw materials of the basket of exportable basically gas and few minerals, international prices rose, exports rose and consequently there was a growth of the product and vice versa before a decline. For example, product of the fall of minerals in the 80s, especially tin, registered negative growth (the lowest is -4.04 in 1983) and since 1987, all are positive figures. Therefore, it is possible to mention an important increase in growth up to 2013 (where the peak growth of 6.8 percent was reached), with a slight reduction of the last 3 years to reach 4.31 in 2016. Unquestionably historically, the fragility of the Bolivian economy rests on its external vulnerability and its extreme dependence on raw materials.

Certainly, since the second semester of 2005 and with the beginning of the bonanza and the rise to power of the President of indigenous roots Juan Evo Morales Aima, represented an opportunity to reverse the historical inequities and the lag in terms of development for Bolivia, this implied the construction of an inclusive, equitable and just society for the well-being of Bolivians. Likewise, the income boom produced by gas was an opportunity, the most important in democracy to reverse the trends of poverty, vulnerability and inequalities in which Bolivians have historically lived. The continuous fiscal surplus of the last years, the macroeconomic stability, the wide scenario of normative redesign, the process of decentralization and autonomies empowering the local and regional governments, represented an opportunity of a public management that responds better to the real needs of the people. Therefore, it is important to make a balance, accountability, an economic evaluation of the achievements, of the pending tasks and the use or not of the bonanza.[26]

26 This research, unfortunately, does not measure pro-poor growth, or the relation or impact (relative and absolute) that the bonanza had in reducing poverty or reversing inequality, nor does it evaluate the level of expenditure of gas revenues or if this was of quality, the study focuses on the distributive effect of income (low, medium and high) to identify social mobility, however, this motivates further research and analysis.

Graph 1
Bolivia: Economic Growth (1951-2017)



Source: National Institute of Statistics (INE), BCB, UDAPE. A century of Economy in Bolivia 1900-2015. Topics of Economic history. Konrad Adenauer Foundation (KAS). 2018. Plural Publishers. ISBN: 978-99954-1-852-6.
Elaboration: Own.

b. Panel B:

According to Velásquez, Iván and Dips, Luis (2018)[27] in Bolivia, moderate and extreme monetary poverty[28] at the country level is measured based on the household survey, that is, methodologically in Bolivia, the collection of data to measure levels of poverty is done using a "Household Survey" that measures living standards, which is part of the Latin American project MECOVI (Measurement of Living Conditions) in which information about health, education, socio-demographic characteristics is collected of the individual and their consumption levels as a proxy of their disposable income.

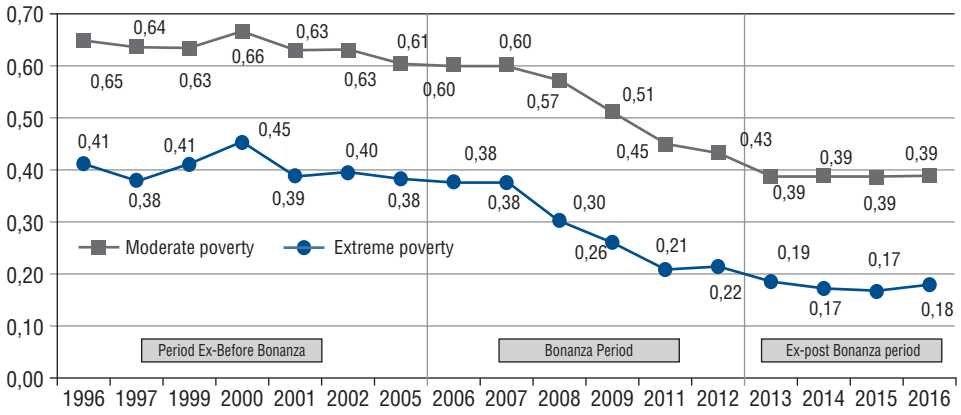
The incidence of poverty (Graph 2) represents the proportion of the population that has an income below the standard represented by the poverty line. Poverty between 1996 and 2006 in the ex ante period to the bonanza reached 65 percent of the population in 1996 and 60 percent in 2006 the reduction of moderate poverty was only 5 percentage points in a decade. In the case of extreme poverty in 1996, 41 percent of the population were considered extreme poor. In 2006, this figure was 38 percent, with a reduction of only 3 percentage points in a decade and, in general, the reduction of poverty, moderate and extreme was very mild. Between 1985 and 1995, the reduction of poverty was due to the increase in employment, the level of per capita income and the stability of prices that, in general,

27 Velásquez, Iván y Dips Luis. (2018). Pobreza, Salud, estándar de vida y desigualdad en Bolivia 1900 – 2016. En: Un siglo de Economía en Bolivia 1900-2015. Tomo II. Working Papers. Fundación Konrad Adenauer (KAS). Plural Editores. ISBN: 978-99954-1-852-6.

28 According to Velásquez, Iván (2017), unfortunately there is very little evidence on the dynamics of poverty using data panels at the rural and urban levels. The analysis and evaluation focuses only on cross-sectional analysis with emphasis on urban centers. In this sense, databases to measure poverty in a dynamic perspective are scarce, but information accumulated in recent years allow somehow to perform the analysis. According to the available statistical information, it is argued that the analysis in Bolivia on poverty has had a strong urban orientation, because the collection of data on the welfare of families was concentrated in urban centers, especially in the nineties, This orientation in the analysis leaves a big question about the nature, magnitude and characteristics of rural poverty in which Bolivia is a constant. The heterogeneity in which the rural poor live - in education, per capita income, health, access to services, security and land tenure among others - makes the implementation of public policies to reduce poverty for rural areas they are designed taking into consideration the real condition of the poor who live far from the cities, in the periphery or in rural centers. Therefore, a clear understanding of the socioeconomic status of the rural poor is crucial to design and implement effective programs and policies to promote development with equity that reduces the exclusion in which a significant number of Bolivians, especially indigenous or peasants, live. Perhaps the most accurate value judgment on poverty in our country is that issued by the World Bank, (2006) which indicates that: poverty in Bolivia is extremely high and has proved stubbornly difficult to reduce. Velásquez (2007) using panel data and from probit and tobit models, shows that poverty is directly associated with the deprivation of essential assets to live, is common among indigenous people who have low educational levels. Rural areas, especially in the west due to their arid and semi-arid condition, are considered less favored, where small farmers with small plots of land do not have access to credit or basic infrastructure. In urban areas, the poor are concentrated in the informal sector and in the periphery of cities such as Alto in La Paz and Plan 3000 in Santa Cruz (Velásquez, 2007).

constituted a coherent macroeconomic management. Despite the fall of the product in 1999 and the slowdown of the economy in 2001, between 1996 and 2006, the slight reduction in moderate and extreme poverty was apparently due to the institutional reforms undertaken in Bolivia of the first and second generation, the moderate economic growth, changes in the labor market and the recovery of levels of social spending in health and education, however this reduction occurs in greater intensity in the urban area compared to rural.

Graph 2
Bolivia: Incidence of moderate poverty and extreme poverty[29]



Source: National Institute of Statistics (National Employment Survey, November 1996 and 1997, Household Survey - Measurement of Living Conditions Program, November - December 1999, 2000, 2001 and 2002 and Survey of. Households 2003-2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012, 2013, 2014, 2015 and 2016).
Elaboration: Own.

Poverty between 2006 and 2013 in the boom period reached 60 percent of the population in 2006 and 39 percent in 2016 the reduction of moderate poverty was -21 percentage points in a decade. In the case of extreme poverty in 2006, 38 percent of the population were considered extreme poor. By 2016, this figure was 19 percent, with a decade reduction of -19 percentage points, which can be concluded that the reduction of moderate and extreme poverty in the bonanza of raw materials was important and significant. It should be noted that the trajectory of moderate and extreme poverty followed the same trend although with relative and absolute values different in magnitude. Certainly the bonanza brought about a substantial advance in terms of moderate but more significantly extreme poverty reduction, due first to the growth of the economy and its distribution effect, improvement in wage income, increase in employment, sustained increases in the minimum living wage (Table 1), conditional transfers, and increased remittances from Bolivian migrants abroad (Graph 3).

29 Note: In the methodological sense, the graph that is presented is clearly illustrative, since it tries to show the ascents and descents in the incidence of moderate and extreme poverty, but it is worth clarifying that the data are not comparable from one year to the next since the surveys of households differ methodologically and sample from one year to the next.

The contribution of the National Minimum Wage (SMN) to the improvement of salaries, especially unskilled labor and technical branches, was substantial in the boom period and this served to improve the income of families who received low wages. In Bolivia, it is called Minimum National Wage (SMN) to the minimum wage that a worker must receive for his work, the Ministry of Economy and Public Finance is responsible for estimating its level and increase and is usually promulgated by Decree Supreme for the President of the State, every May 1st emblematic date in tribute and commemoration to Bolivian Worker's Day. It is considered for its estimation and increase based on the inflation of the previous year. In 1991, the national minimum wage policy was adopted, in which no person in Bolivia can earn less than the central government. In that year, the salary was increased by 55 percent in relation to the previous administration, reaching 120 Bs. In 1996 the SMN was Bs 223, about 7 Bs per day and represented about 44 USD.

A decade later, at the beginning of the bonanza period in 2006, the SMN was Bs 500, about 16 Bs per day and represented about 62 USD. In 2013, the SMN was Bs 1,200, about 40 Bs per day and represented about 172 USD, its increase was certainly significant. For 2018, the SMN represented Bs 2060 about 68 Bs on average per day and represented about 300 USD. In the ex ante period to the bonanza the SMN between 1991 and 2005 only represented in equivalence between 33 USD and 61 USD, in the bonanza period of 62 USD it increased significantly and came to represent 172 USD, until arriving in 2018 at 300 USD. Undoubtedly, this measure improved the income of less qualified workers and the labor force that lived with a subsistence income (Table 1).

Table 1
Evolution of the Minimum Living Wage (1991-2018) Salary

Minimum salary	Minimum or national salary (Bs.)	Daily average (Bs.)	Variation in Percentage	Percentage of Inflation rate	Equivalent to USD	Supreme Decree (Number)	Date of Approval
Period Ex before the bonanza							
1991	120.00	4		14,53	33	22739	01-03-91
1992	135.00	4	12.50	10,46	35	23093	06-03-92
1993	160.00	5	18.52	9,30	38	23410	16-02-93
1994	190.00	6	18.75	8,52	41	23791	30-05-94
1995	205.00	6	7.89	12,58	43	24067	10-07-95
1996	223.00	7	8.78	7,95	44	24280	20-04-96
1997	240.00	8	7.62	6,73	46	24468	14-01-97
1998	300.00	10	25.00	4,39	54	1286 (1)	20-02-98
1999	330.00	11	10.00	3,13	57	145/99 (2)	18-03-99
2000	355.00	11	7.58	3,41	57	25679	25-02-00
2001	400.00	13	12.68	0,92	61	2158 (1)	12-01-01
2002	430.00	14	7.50	2,45	60	26547	14-03-02
2003	440.00	14	2.33	3,94	57	27049	26-05-03
2004	440.00	14	0.00	4,62	55	27049	26-05-03
2005	440.00	14	0.00	4,91	61	27049	26-05-03

Bonanza Period							
2006	500.00	16	13.64	4,95	62	28700	01-05-06
2007	525.00	17	5.00	11,73	65	29116	01-05-07
2008	577.50	19	10.00	11,85	77	29473	05-03-08
2009	647.00	21	12.03	0,26	91	16	19-02-09
2010	679.50	22	5.02	7,18	96	497	01-05-10
2011	815.40	27	20.00	6,9	116	809	02-03-11
2012	1,000.00	33	22.64	4,54	143	1213	01-05-12
2013	1,200.00	40	20.00	6,48	172	1549	10-04-13
Period Ex Post bonanza							
2014	1,440.00	48	20.00	5,19	206	1988	01-05-14
2015	1,656.00	55	15.00	2,95	238	2346	01-05-15
2016	1,805.00	60	9.00	4	260	2749	01-05-16
2017	2,000.00	66	10.80	2,71	287	3162	01-05-17
2018	2,060.00	68	3.00		300	3544	01-05-18

Source: Official Gazette of Bolivia. National Institute of Statistics (INE).
(1) Law of the General Budget of the Nation.
(2) Ministerial Resolution.
Note: The validity is as of January 1 for all the managements from the 2007 management.
Elaboration: Own.

Remittances from migrants from abroad also played an important role in improving the well-being of families in Bolivia in the ex ante period to the bonanza in 2000 according to the Central Bank of Bolivia (BCB) they entered remittances to the country for 92 million USD, that figure at the beginning of the bonanza grew more than 5 times, reaching an income for the country of 569 million USD in 2006, for 2013 remittances from abroad came to represent 1,182 million USD and in the ex post period to the bonanza although they recorded a decrease, they continued contributing to the national income in 2015 with 1,178 million USD and in 2017 with 1,098.5 million USD (Chart No 3).

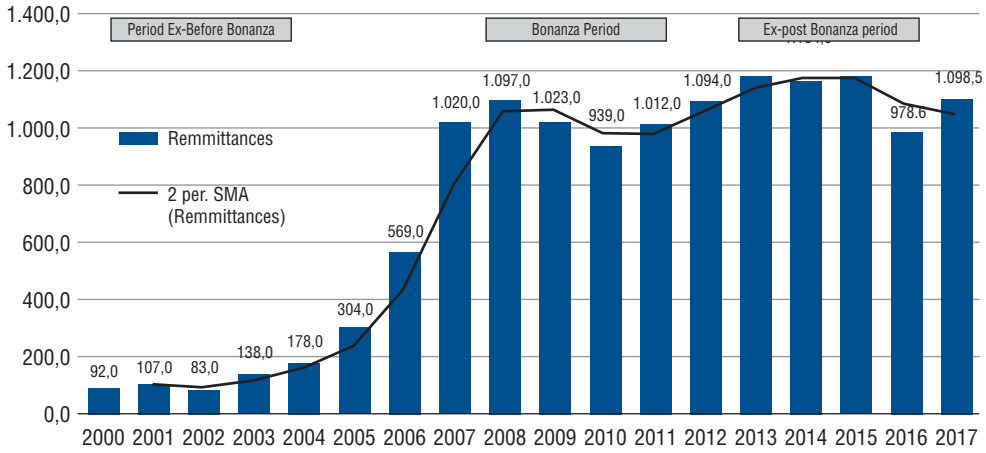
For Wanderley, F. and H. Vera Cossio (2017[30]) the policy of increasing the base salary and the expansion of occupations in the service sector, mainly of the less qualified in a context of economic boom, explain to a great extent a new dynamics of the labor income compared to the period before 2005.

Finally, in the period Ex post to the bonanza the percentage of people living below the moderate poverty line remained unchanged and static between 2013 and 2016 represented 39 percent of the population, in terms of extreme poverty between 19 and 18 percent of the population is destitute. Apparently the reduction of moderate and extreme poverty remained static and without significant changes, in the period ex post to the bonanza, considering that the international prices of raw materials gas and minerals are down and the two markets of destination of gas exports will reduce purchase volumes as is the case

30 Wanderley, F. and H. Vera Cossio (2017). The Dynamics of the Labor Market Bolivia 2005-2015. Institute of Socio-Economic Research. Bolivian Catholic University. Working Document No 01/2017. http://www.iisec.ucb.edu.bo/assets/publicacion/Dt_01_Dinamicas_del_Trabajo1.pdf

in Argentina and with Brazil there will be a renegotiation of contracts, in the medium term what will be the prospects for the reduction in poverty in Bolivia ?, certainly the scenario is uncertain, every time that advances in poverty reduction had their origin and explanation in the bonanza.

Graph 3
Bolivia: Remmittances from abroad
(In millones of USD)



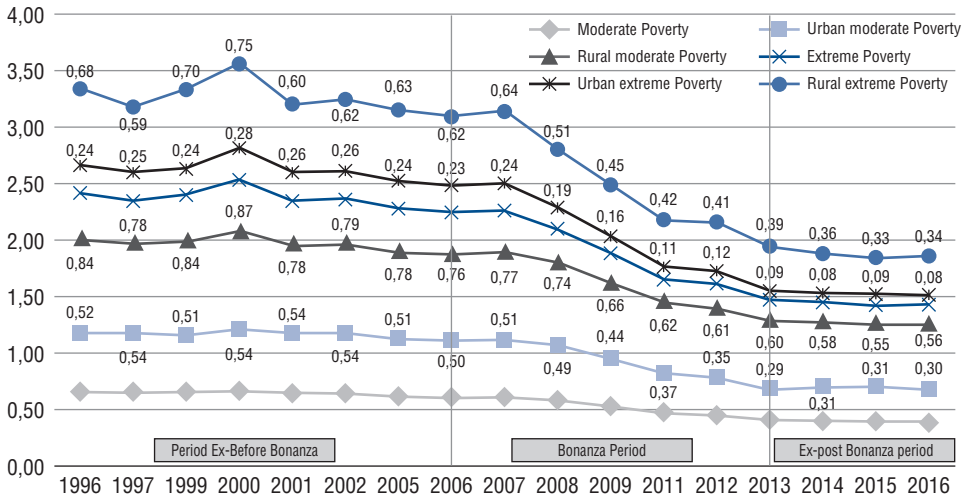
Source: BCB.
Elaboration: Own.

c. Panel C: Poverty by geographic area at urban and rural level

There is a tendency to affirm that poverty in urban centers tends to be reduced with greater intensity than in rural areas, in Bolivia this is not the exception, if we analyze the level of concentration of poverty in Bolivia at urban and rural levels it can be mention that moderate urban poverty decreased from 52 percent in 1996 to 50 percent in 2006 in the ex ante period to the bonanza, that is to say that only -2 percentage points were reduced in approximately a decade (1996-2006), in the period The urban moderate poverty between 2006 and 2013 (Graph 4) fell from 50 percent in 2006 to 29 percent in 2013, -21 percentage points with respect to the start of the raw material boom and if we compare 1996 and 2016 moderate urban poverty decreased by -22 percent. At the rural level, moderate rural poverty in the ex ante period to the bonanza represented 84 percent of the population, for 2006, 76 percent of the rural population lived in conditions of moderate poverty, the reduction was -8 percentage points , while in the boom period that reduction doubled -16 percent in 2013 (60 percent) compared to 2006 (76 percent). Certainly the intensity and severity of poverty is greater in the rural world than in the urban one, but paradoxically, efforts to reduce moderate poverty are more intense in the urban area than in rural areas. If we analyze extreme poverty in 1996, 24 percent of the population lived below the extreme poverty line for 2006, but it had been reduced by -1

percent (23 percent, 2006) for 2013, extreme poverty in the urban area was reduced to 9 percent of the population (-15 percent decrease). In the rural area, extreme poverty was redressed with greater intensity in 1996, 68 percent of the population in the rural area lived below the extreme poverty line, for the good times in 2013 the people living below the extreme poverty line represented 39 percent of the rural population registering a reduction of -29 percent, the empirical evidence and the academic community have suggested that poverty in Bolivia is widespread, wide and severe, especially in rural areas where extreme poverty prevails and where it has a peasant and indigenous face, the reduction of extreme poverty in the rural world is an interesting and significant advance in the struggle for the reduction of poverty in Bolivia.

Graph 4
Bolivia: Porverty by geographic area at urban and rural level



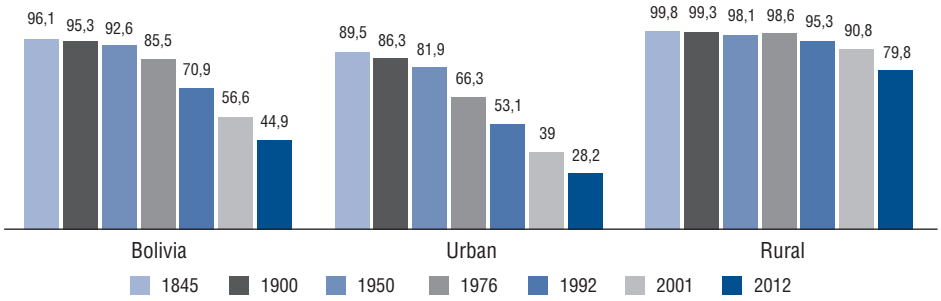
Source: National Institute of Statistics (National Employment Survey, November 1996 and 1997, Household Survey - Measurement of Living Conditions Program, November - December 1999, 2000, 2001 and 2002 and Survey of Households 2003-2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012, 2013, 2014, 2015 and 2016).
Elaboration: Own

The Unsatisfied Basic Needs

Empirical evidence highlights the fact that indicators of monetary poverty (consumption as a proxy for income) are insufficient to measure, the quality of life of the population or the characteristics and living conditions of the population. Velásquez, I. and Dips L. (2018) based on the census information showed estimations about the distribution of the poor population by census and area of residence following the methodology proposed by the Economic Commission for Latin America (ECLAC) of the Basic Needs Unsatisfied (NBI), clearly showed that since 1845 poverty is a national phenomenon that covers more than 90 percent of the population where the population is mostly indigenous and mestizo, although there is evidence of progress with regard to its reduction according to the In

2012, almost half of the population (4,490,000 Bolivians) still have unsatisfied basic needs and, comparing it according to the area of residence, it is a priority phenomenon more rural than urban (Graph 5).

Graph 5
Distribution of the Poor Population by Census and Area of Residence 1845-2012
(In Percentage)



Source: Biblioteca de la Vicepresidencia del Estado Plurinacional. Pentland, J.B. (1826), Oficina de Estadística (1831), Comisión Estadística (1845), D'Orbigny, A., (1845), Dalence, J.M. (1851). Oficina Nacional de Inmigración, Estadística y Propaganda Geográfica (1900). Dirección Estadística y Censos (1950) Ministerio de Hacienda y Estadística (1950). Instituto Nacional de Estadística: INE (1976, 1992, 2001, 2012).
Elaboration: Velásquez, I. y Dips L. (2018).
Notes:

- **Estimate.** Based on the Methodology of Unsatisfied Basic Needs (NBI): It is a direct method to identify critical deficiencies in a population and characterize poverty. It usually uses indicators directly related to four basic needs areas of people (housing, health services, basic education and minimum income), available in the population and housing censuses. In Latin America, it is a widely used method, as a result of its recommendation and use by ECLAC since the 1980s. It was proposed in the 1960s. It is distinguished from other indicators related to the standard of living of the population, such as indigence indices (extreme poverty) and poverty, in the fact that the latter measure the income of a person or a family, and deduce from it their level of life, so they are called indirect methods. The INE of Bolivia establishes the NBI, where the poverty statistics associated with a state of need, lack or deprivation of the goods and services that determine the satisfaction of the basic needs of a person or a household, specifically, infrastructure conditions are evaluated of housing, energy inputs (access to electricity and fuel for cooking), educational levels and health care of the population. These aspects represent a measure of structural poverty.
- **Censuses:**

1831 – 1835	Presidency del Mariscal Andrés de Santa Cruz.
1845	President General José Ballivián.
1854	President Manuel Isidoro Belzú.
1882	President Narciso Campero.
1900	President José Manuel Pando.
1950	President Mamerto Urrolagoitia.
1976	President General Hugo Banzer Suarez.
1992	President Jaime Paz Zamora.
2001	President Jorge Quiroga Ramírez.
2012	President Juan Evo Morales Ayma.

In Graph 5 the information is disaggregated at the level of Bolivia and area of residence, the evolution of the population with unsatisfied basic needs (poor population) shows that from the population census of 1845 to 1900, 96.1 percent of the population and 95.3 percent of the population following the methodology of the Unsatisfied Basic Needs (NBI) was considered as poor, the poverty in the first 75 years of the new republic

included almost the entire majority of the indigenous population that resided in the rural area. In the urban area, the conditions and needs for housing, health services, basic education and minimum income were not the best and Bolivia was trapped in poverty and with basic housing, basic services, health, education and infrastructure needs dissatisfied (Velásquez, I. and Dips L., 2018).

According to Velásquez, I. and Dips L. (2018), the phenomenon of poverty clearly has its indigenous facet in Bolivia and affects indigenous people in the highlands and lowlands, since the beginning of the republic the indigenous people in Bolivia represent the majority of the Bolivian population 6 of every 10 Bolivians are indigenous (2015), live in the rural area and speak different native languages. Graph 5 presents census results, up to the census that was conducted in 2012. And certainly households in rural areas are presented with a greater number of needs than urban. The differences between rural and urban in the access of the population to goods and services of first necessity, education (quality), health services (coverage), housing and basic services of water and sewerage configure a society, the marked Bolivia heterogeneities and asymmetries. Table 2 attempts to show the needs disaggregated at the regional level.

Table 2
Population with unsatisfied basic needs
annual variation - censos 1976, 1992, 2001 and 2012
(In percentages)

Departament	Census				Average annual variation (1)		Variation Accumulated
	1976	1992	2001	2012	1976-2001	1992-2001	2001-1976
BOLIVIA	85.5	70.9	58.6	44,9	(1.08)	(1.33)	(26.90)
Chuquisaca	90.5	79.8	70.1	54,5	(0.82)	(1.05)	(20.40)
La Paz	83.2	71.1	66.2	46,3	(0.68)	(0.53)	(17.00)
Cochabamba	85.1	71.1	55.0	45,5	(1.21)	(1.74)	(30.10)
Oruro	84.5	70.2	67.8	47	(0.67)	(0.26)	(16.70)
Potosí	92.8	80.5	79.7	59,7	(0.53)	(0.09)	(13.10)
Tarija	87.0	69.2	50.8	34,6	(1.45)	(1.99)	(36.20)
Santa Cruz	79.2	60.5	38.0	35,5	(1.65)	(2.43)	(41.20)
Beni	91.4	81.0	76.0	56,4	(0.62)	(0.54)	(15.40)
Pando	96.4	83.8	72.4	58,8	(0.96)	(1.23)	(24.00)

Source: UDAPE
Elaboration: Own.
Note: (1) For the calculation of the average annual variation between 1976 and 2001, the intercensal period is 24 years, 11 months and 12 days. From 1992 to 2001 it is 9 years, 3 months and 5 days.

If we analyze poverty from the census point of view, Table 2 shows the census results, up to the last census that was carried out in 2012. The information is disaggregated by department and it is possible to know the evolution of the population with unsatisfied basic needs (poor population). In 1976, 85.5 percent of the population lived with unsatisfied

basic needs and then there were regions such as Pando where this indicator stood at 96 percent; practically all the population was poor and had a multiplicity of needs from housing, access to drinking water, sewerage, infrastructure, health, education. For the country this indicator fell to 70.9 percent and then to 58.6 percent in 2001. In the last census of population and housing in 2012 the basic needs of the population reached 44.9 percent of the population. Looking back, one can verify the slow decline of these indicators.

Within the regions the most important advance was reached by Santa Cruz, where poverty fell from 79.2 in 1976, to 38 percent in 2001 and 35.5 in 2012. In the same period there was a significant improvement in Tarija and Cochabamba. At the other extreme, in departments like Potosí, Beni and La Paz the advances were less significant. The departments with greater poverty to the 2001 census are Potosí, Beni and Pando; However, by 2012 the fiscal bonanza that has an impact on the redistribution of income, improvements in infrastructure, advances in health (construction of hospitals) and education (construction of schools), in recent years has generated additional improvements at the national and particularly in departments such as Tarija, where gas rent has meant a significant change in the income of people, as well as in Oruro and Potosí in Pando and Beni also significant progress was recorded.

d. Panel D: Inequality by geographic area at urban and rural level

In Bolivia, poverty is a social problem that affects a sample of the population, however inequality affects the important universe of the Bolivian population, which is a more negative phenomenon for well-being, therefore extreme income inequality in Bolivia is a national phenomenon that is related to access to opportunities. Persistent high levels of inequality have a negative effect on the prospects for economic growth and are associated with forms of economic exclusion (Justin, Litchfield and Whitehead, 2003). Long evidence has shown that countries with high levels of inequality have low levels of growth (Datt and Ravallion, 1992 and Kanbur and Lustig, 1999). Likewise, high levels of inequality will impede social cohesion and increase social and political conflict. This will eventually create insecurity and distrust among economic agents, which is a risk to economic growth and social development (Justin, Litchfield and Whitehead, 2003). The Gini coefficient is one of the most common indicators used to measure income inequality, which is between 0 (perfect equality) and 1 (perfect inequality), but typically its range is between 0.3 - 0.5 for expenses or income per capita.

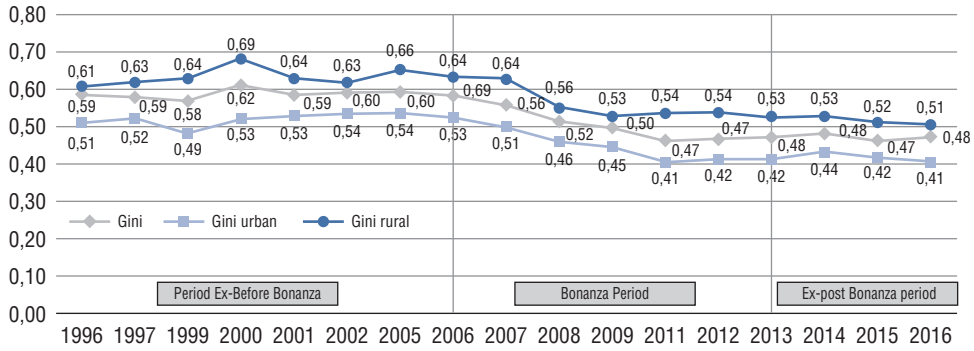
In the ex ante period to the bonanza income inequality measured by the Gini coefficient was high with respect to international standards 0.59 for 1996 and this level of inequality was behind those registered in Brazil and Chile, a decade later in the ex ante period to the bonanza with slight variations from year to year did not change and in 2006 the Gini coefficient was 0.59, in a decade this indicator had not changed substantially. At urban level income inequality increased from 0.51 in 1996 to 0.53 in 2006 due to wage heterogeneities in the labor market, this phenomenon was also similar at the rural level of 0.61 in 1996 rose to 0.64 in 2006. This reflects that income disparities, heterogeneous salary allocations and the way in which they were accumulated were

inequitable and did not undergo significant changes between 1996 and 2006 (Graph 6). In the boom period, the increase in the national minimum wage, the government's decision not to receive a remuneration higher than that of the President of the State, the income distribution effect, the conditional transfers among others generated a decrease of the Gini coefficient of 0.59 in 2006 to 0.48 in 2013, -11 points were reduced inequality at the national level, at urban level also reduced the inequality -11 points, from 0.53 in 2006 to 0.42 in 2013, a rural level from 0.64 to 0.53 between 2006 and 2013, with a reduction also of -11 points in the bonanza period. In the ex post period of the bonanza, the national Gini reached 0.48, the urban Gini reached 0.41 and the rural 0.51, reflecting the fact that income inequalities and their heterogeneities are a pending agenda problem. Below we show complementary measures of poverty[31] that reflect its incidence, gap or amplitude and severity. In terms of inequality[32] other measures that reflect the level of inequalities from household surveys, subsequently the poverty lines used in the present investigation are presented.

31 In this research, poverty refers to the deprivation of people or households in the satisfaction of their basic needs, particularly material needs. Some approaches, in addition to observing the material results of poverty, also refer to the absence of certain individual and collective capacities (UNDP, 1997). From the perspective of the observable consequences of poverty, the main methods of measurement are two (Vos, 1998): the indirect method (or method of income or consumption) and the direct method (or the unsatisfied basic needs or income method, or social indicators). Table No 2 uses the first. The indirect method measures the standard of living based on the income of people or households. Part of the estimation of a poverty line, defined as the minimum cost of a basket of goods and services that meets the basic needs of the household (food, housing, clothing, education and health). "Households" (and their members) whose per capita income is less than the poverty line are considered "poor" (Table 3). The incidence [FGT (0)] of poverty estimates the number of poor, but says nothing about the degree or intensity of their poverty; in other words, it does not reflect how poor are the poor people, and what differences exist between them. The Gap [FGT (1)] of poverty is the index that indicates the aggregate deficit of poverty that the poor population has in relation to the poverty line. The severity of poverty represents the weighted sum of the poverty gaps of poor individuals, where the weights are the gaps, expressed as a proportion of the poverty line, between the income of these same poor individuals and the poverty line. Given that the weights increase as the income gap increases, this measurement is sensitive to inequality among the poor. It is an indicator that serves to analyze the worsening of poverty and the differences between the poor over time.

32 Inequality: The Atkinson index is a measure of income inequality. It is one of several indices developed by the British economist Anthony Barnes Atkinson. This index appears among the family of normative indexes enunciated in an article of Atkinson of 1970, published in the Journal of Economic Theory. The measure is useful to determine which end of the distribution contributed the most to the inequality observed. The Theil index is a measure of inequality based on Shannon's entropy. It serves to measure and compare the distribution of income. According to Cotler, Pablo said index can be disaggregated into a component of inequality within study groups, and another corresponding to inequality between groups. In: https://es.wikipedia.org/wiki/%C3%8Antkinson

Graph 6
Inequality by geographic area at urban and rural level



Source: National Institute of Statistics (National Employment Survey, November 1996 and 1997, Household Survey - Measurement of Living Conditions Program, November - December 1999, 2000, 2001 and 2002 and Survey of Homes 2003-2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012, 2013, 2014, 2015 y 2016).
Elaboration: Own.

Table 2
Additional Measures of Poverty and Inequality (1996-2017)

Meassure	1996	1997	1999	2000	2001	2002	2005	2006	2007
Poverty									
FGT (0) Incidence	0.65	0.64	0.63	0.66	0.63	0.63	0.61	0.60	0.60
FGT (1) Gap	0.20	0.21	0.22	0.25	0.23	0.22	0.17	0.17	0.20
FGT (2) Severity	0.14	0.14	0.13	0.15	0.14	0.13	0.09	0.09	0.11
Inequality									
GINI	0.59	0.59	0.58	0.62	0.59	0.60	0.60	0.59	0.56
ATKINSON	0.28	0.27	0.35	0.40	0.33	0.40	0.30	0.35	0.33
THEIL	0.46	0.44	0.50	0.61	0.62	0.69	0.55	0.47	0.49
General Entropy	0,92	1,08	1,10	1,12	1,48	1,66	1,80	1,45	0,97

Measure	2008	2009	2011	2012	2013	2014	2015	2016	2017
Poverty									
FGT (0) Incidence	0.57	0.51	0.45	0.43	0.39	0.39	0.39	0.39	0.34
FGT (1) Gap	0.21	0.15	0.17	0.18	0.16	0.19	0.20	0.18	0.17
FGT (2) Severity	0.13	0.08	0.09	0.11	0.09	0.11	0.14	0.12	0.11
Inequality									
GINI	0.52	0.50	0.47	0.47	0.48	0.48	0.47	0.48	0.44
ATKINSON	0.30	0.24	0.31	0.38	0.40	0.44	0.52	0.58	0.58
THEIL	0.57	0.43	0.51	0.56	0.63	0.71	0.78	0.81	0.82
General Entropy	1,43	1,91	1,08	1,13	1,2	1,25	1,33	1,39	1,45

Source: National Institute of Statistics (National Employment Survey, November 1996 and 1997; Household Survey - Measurement of Living Conditions Program, November - December 1999, 2000, 2001 and 2002 and Survey of Households 2003-2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012, 2013, 2014, 2015 and 2016).
Elaboration: Own.

Table 3
Lines of moderate poverty and estimated values by geographical area (1996-2016)

Year	Poverty Line Moderate - Urban	Urban Area Estimated value	Poverty Line Moderate - Rural	Rural Area Estimate Value
1996	295.78	0.52	214.03	0.84
1997	309.26	0.54	226.73	0.78
1999	323.64	0.51	237.10	0.84
2000	323.01	0.54	231.60	0.87
2001	320.87	0.54	231.47	0.78
2002	321.78	0.54	233.39	0.79
2005	358.45	0.51	281.52	0.78
2006	383.57	0.50	294.00	0.76
2007	463.43	0.51	360.06	0.77
2008	564.36	0.49	419.72	0.74
2009	572.22	0.44	424.38	0.66
2011	582.92	0.37	441.40	0.62
2012	597.34	0.35	460.84	0.61
2013	613.98	0.29	469.28	0.60
2014	629.47	0.31	480.38	0.58
2015	637.24	0.31	496.14	0.55
2016	646.93	0.30	507.28	0.56

Line of extreme poverty and estimated value by geographic area (1996-2016)

Year	Poverty Line Extreme - Urban	Urban Area Estimated value	Poverty Line Extreme - Rural	Rural Area Estimated value
1996	148.78	0.24	96.22	0.68
1997	156.45	0.25	115.37	0.59
1999	171.81	0.24	134.73	0.70
2000	171.46	0.28	131.61	0.75
2001	170.44	0.26	131.53	0.60
2002	170.90	0.26	133.04	0.62
2005	197.17	0.24	160.47	0.63
2006	210.64	0.23	167.58	0.62
2007	253.20	0.24	205.23	0.64
2008	305.88	0.19	239.24	0.51
2009	311.47	0.16	247.31	0.45
2011	325.72	0.11	258.33	0.42
2012	335.21	0.12	273.83	0.41
2013	351.89	0.09	286.19	0.39
2014	365.78	0.08	295.73	0.36
2015	381.73	0.09	295.56	0.33
2016	395.98	0.08	304.13	0.34

Source: National Institute of Statistics (National Employment Survey, November 1996 and 1997, Household Survey - Measurement of Living Conditions Program, November - December 1999, 2000, 2001 and 2002 and Survey of Households 2003-2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012, 2013, 2014, 2015 and 2016).
Elaboration: Own.

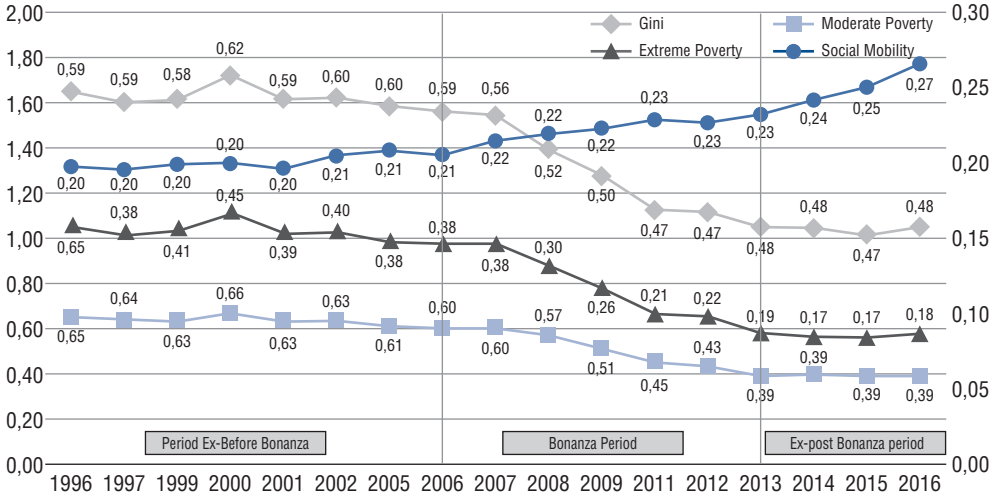
e. Poverty, inequality and social mobility

We have emphasized that social mobility can be defined generically as any change in time of the social and economic attributes of a subject, be it a person, a home or a social group in this case that change occurs from their income level, of their status or level of poverty or equity. Certainly, to study social mobility it is important, therefore, to record the economic history of the corresponding subject, or deduce it from peculiar statistical techniques. We have also mentioned that poverty, inequality and social mobility are phenomena that are definitely linked. Societies where poverty levels are high and inequality reaches the population as a whole at some moments in the economic history of Bolivia, there will hardly be mobility among the different strata of society among its inhabitants, even when economic and social opportunities arise, human development favor small groups of society, it is very likely that poverty and inequality are persistent and high. In this sense, if the concentration of opportunities is persistent over time and, therefore, there is little social mobility, poverty and inequality will tend to perpetuate.

The empirical strategy, as explained in the methodological section, includes using the data series of household surveys, considering the economically active population that, within its members, it is possible to have information from parents and children, to achieve the follow-up in time, what is sought is that with the income and occupation information of the parents, an estimate is made with the logarithm of the hourly wage of each individual and to verify social mobility, the methodology of Dang et.al will be used. (2014), which allows to see the probability of changes, between periods, of strata, which, in a certain way, illustrates the changes that can explain the trend in time between low, medium and high income strata. A first element to achieve stratification will be the delimitation of thresholds, to estimate individually the belonging to a stratum at each moment of time.

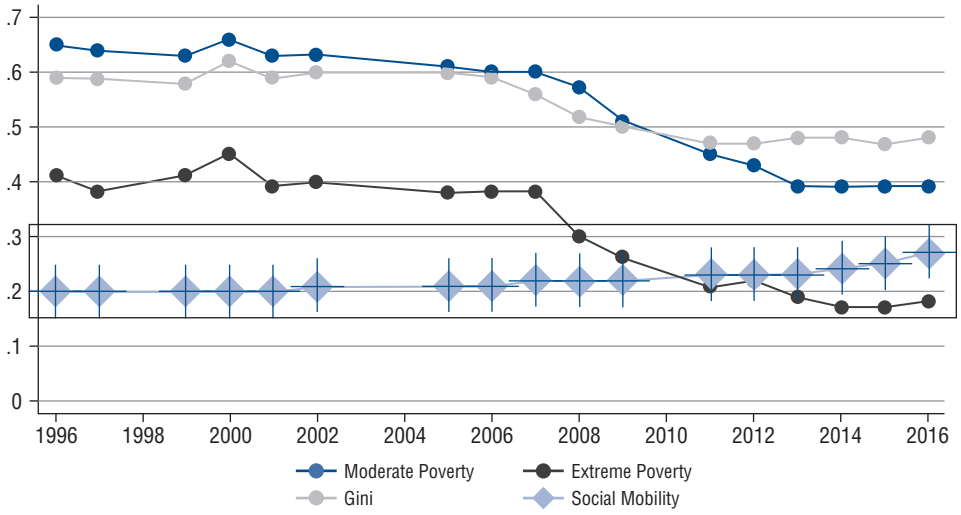
Social mobility refers to a change of structure, graph 6 and 7, relates poverty, inequality and social mobility, where it is possible to appreciate between 1996 and 2006 ex ante period to the bonanza that there was no mobility in the income level in the strata of study and the probability of change and mobility in the strata analyzed was almost zero in a decade, 0.20 in 1996 and 0.21 in 2006, correspondingly the incidence of moderate monetary poverty (1996 = 0.65 and 2006 = 0.60) and extreme (1996 = 0.41 and 2006 = 0.38) slightly experienced a subtle reduction, the inequality in the ex ante period to the bonanza in 1996 and 2006 remained at a high Gini coefficient according to international standards of 0.59 and in a decade between 1996 and 2006 there was no decline and remained unchanged. The economic theory in this scenario establishes that in a scenario of low mobility, high poverty and high inequality economic opportunities for families are scarce, a few take advantage of these opportunities tend to transfer between families and society presents a high discrimination with social exclusion, the level of income is low and consequently there is a low accumulation of capital.

Graph 6
Social mobility, poverty and inequality



Source: National Institute of Statistics (National Employment Survey, November 1996 and 1997, Household Survey - Measurement of Living Conditions Program, November - December 1999, 2000, 2001 and 2002 and Survey of Households 2003-2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012, 2013, 2014, 2015 and 2016).
Elaboration: Own.

Graph 7
Social mobility, poverty and inequity



Source: Household Survey – Measurement of Living Conditions Program, November - December 1999, 2000, 2001 and 2002 and Survey of Households 2003-2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012, 2013, 2014, 2015 and 2016).
Elaboration: Own.

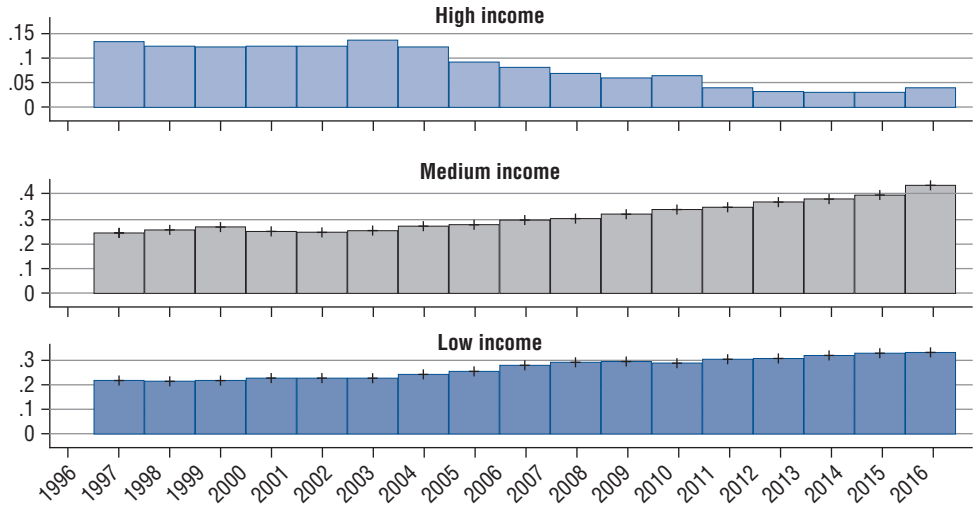
In the boom period, the results of the estimations show a mobility of structural, ascending social type due to the improvement in the distribution of income, certainly the economic growth, its distribution effect, the improvements in the national minimum wage, the remittances and the contribution of the tertiary sector of the economy improved the income of the head of the household and mobility in the boom period experienced a relative rise from 0.21 in 2006 to 0.23 in 2013, that mobility coincides with reductions in the incidence, poverty gap and severity (Table 2) and the relative decline in inequality. In the period Ex post to bonanza after 17 years social mobility reaffirms its structural characteristic of ascending type and its probability of 0.23 in 2013 reaches 0.27 in 2016, it is certainly an interesting change although poverty indicators and inequality have not undergone significant changes.

In four years there was no change in social indicators of poverty and inequality, between 2013 and 2016 the Gini coefficient remained at 0.48, the incidence of moderate poverty in 2013, 2014, 2015 and 2016 was 0, 39, extreme poverty stayed at 0.18.

Finally, in Figures 6 and 7 it is possible to see a progressive trend in the indicator calculated with the methodology Dang et.al (2014) referred to in section 3, which shows an increasing trend of the mobility indicator in the study period (1996-2016) that manifests as upward structural mobility from the bonanza period and is best expressed in the ex post period to the bonanza, which is explained by the relative position of the income of individuals, without interference from any effect (for example price), since this ordering is given by the probability of belonging to a particular stratum (high, medium or low, distribution effect). However, if mobility is seen as a whole (1996-2016), its tendency would be with moderate characteristic, slow and progressive and marked by a reduction in the high income stratum, a significant and significant increase in the middle stratum, promotion and significant increase in the low income stratum.

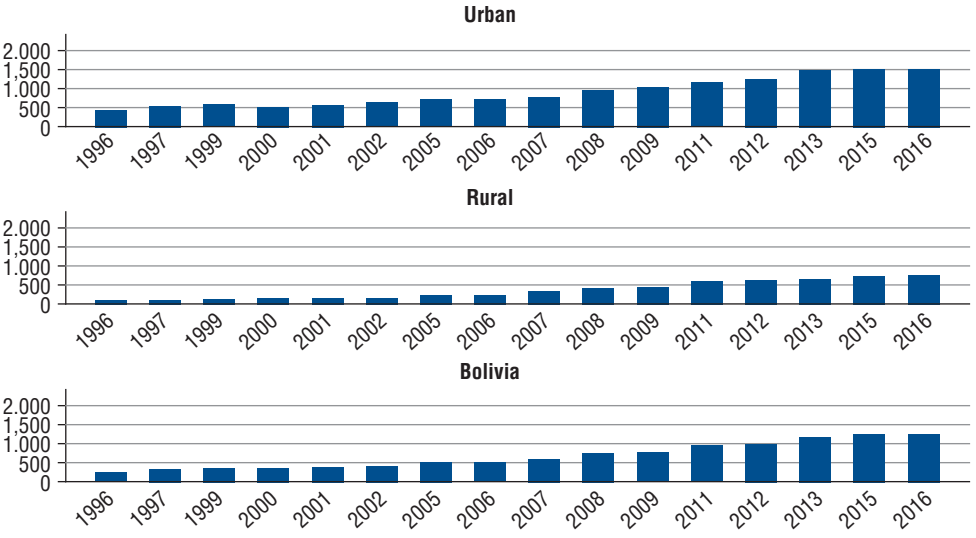
However, the trend of the indicator of social mobility is not homogeneous, but differentiated between strata, Graph 8 shows the trend of the estimation of social mobility differentiated by income strata, with a reduction of social mobility in the upper stratum, and an upward trend and increases in the lower and middle strata, this is due to a new configuration and income stratification that began in 2006 due to the boom, the expansive economic cycle and the growth of the economy experienced between 2006 and 2016 that played an important role in the distribution of the surplus, the improvement of individual income and other variables explained extensively in previous sections. It is clear that the trends of poverty, inequality and social mobility are influenced by a progressive growth over time, as shown in Figure 9, however, seeing graphically the change in income distribution allows us to appreciate, if there were improvements in relationship to the poverty indicators presented in panel C of Graph 1. Certainly the improvement of the income of the household is best expressed in the urban area, this is related to the reduction of urban poverty, but the great pending task is the improvement in rural income levels.

Graph 8
Social mobility by income strata



Source: National Institute of Statistics (National Employment Survey, November 1996 and 1997, Household Survey - Measurement of Living Conditions Program, November - December 1999, 2000, 2001 and 2002 Home's Surveys 2003-2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012, 2013, 2014, 2015 y 2016).
Elaboration: Own.

Graph 9
Evolution of the average household income per capita, by geographic area



Source: Household Survey - Measurement of Living Conditions Program, November - December 1999, 2000, 2001 and 2002 and Survey of Households 2003-2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012, 2013, 2014, 2015 and 2016).
Elaboration: Own.

Graph 10 shows the function of income density for the 1996 to 2016 series, showing a change in the distributive pattern from 1996 to 2005, in relation to 2006 to 2016. Panel E of Graph 10 shows the density function for the whole series extending to income up to Bs.5000 (three times above the median income); however, when differentiating the first series, from 1996 to 2005 (panel F) of the second series from 2006 to 2016 (panel G) and reducing the range to twice the median income, it is possible to see how the distribution has flattened in time, with a greater concentration in the central part, having of platicuric distributions (coefficient of kurtosis) in the first series, to more mesocuric for the second series (coefficient of kurtosis). This change in the distributive pattern of income gives us the guide to differentiate the results of social mobility, as presented in table 4.

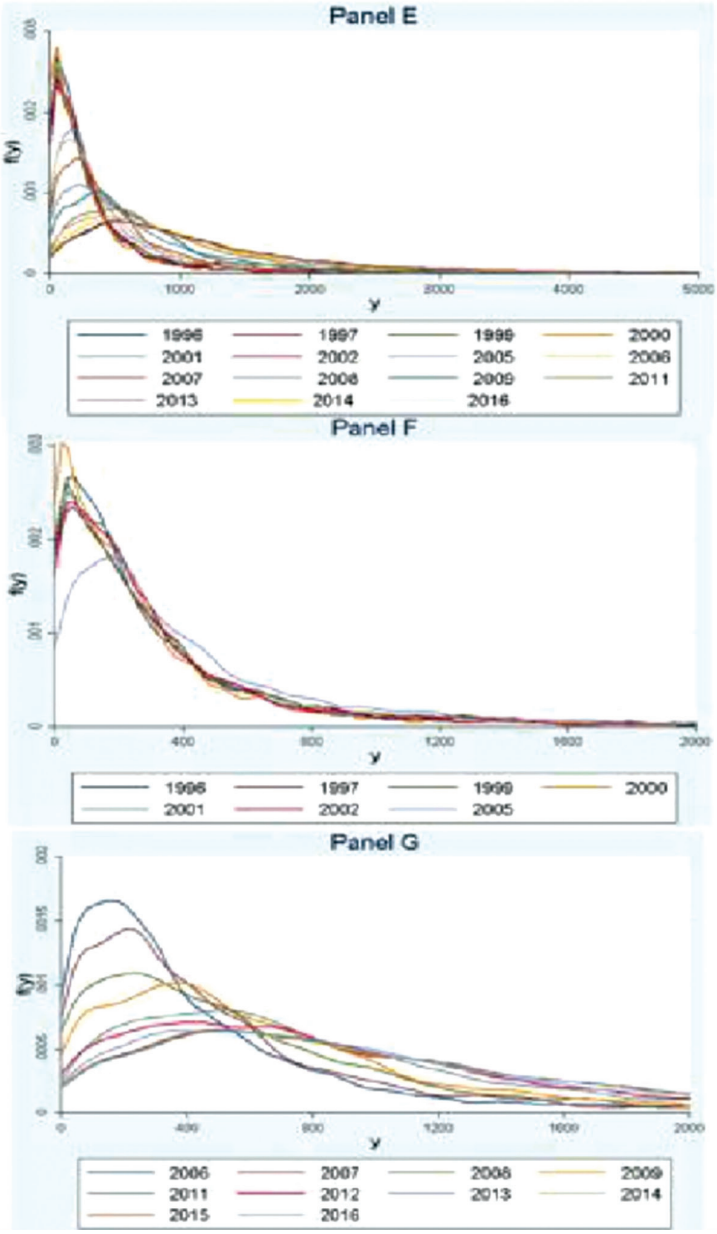
Taking the series A from 1996 to 2005 and the series B from 2006 to 2016, denoted by l = A, B, and the seven strata, denoted by m = 1, 2,. . . , 7; the sixth column of table 4 quantifies the absolute time variation between series ΔYl, m; and the seventh column the relative variations Tl, m. Within each cell, in the second and third rows, the difference between absolute and relative stratum is quantified (verified by a stratum with its immediate lower one), denoted by ΔYl, mm-1 and Tl, mm-1.

Table 4 gives an account of the transition matrix of social mobility between income strata, quantifying the ascending and descending movements. It is interesting to see a downward movement from the high stratum to the middle is the most marked in the series from 2006 to 2016, at the same time the movement between series, for example, when comparing the movement between series from 1996 to 2005 from the high stratum to the medium in relation to the movement of the same category of the series from 2006 to 2016, it is possible to appreciate that there is an increase in social mobility, as shown in Graph 8.

The absolute variation between series, in most of the strata is negative, however the movements between series of high to medium, medium to medium and low to medium are positive (0.17, 0.01 and 0.08); that as a relative variation, they are also the most marked movements (the relative variation from high to medium is 1.19, the highest of the rest, which in percentage terms, would show a change greater than 110 percent), which provides a large part of the explanation of the positive variation between periods and the complete series.

In columns 3 and 4 of table 4, as indicated, the absolute and relative inter-stratum variation (relative to its immediate lower stratum) is quantified in rows 2 and 3 of each cell. In the second row, second column, the value 0.03 accounts for a positive displacement from high-high to high-medium strata, in series A, denoted as ΔYA, 12, which in relative terms, TA, 12, comprises a change of 0.26, in proportion (or comprised as 26 percent), a situation that worsens in series B, when quantifying ΔYB, 12 with a result of 0.26, and a relative increase TB, 12 more of 300 percent.

Graph 10
Final per capita household income distribution function



Source: National Institute of Statistics (National Employment Survey, November 1996 and 1997, Household Survey - Measurement of Living Conditions Program, November - December 1999, 2000, 2001 and y 2002 and Home's Survey 2003-2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012, 2013, 2014, 2015 y 2016).
Elaboration: Own.

Table 4
Matrix of transition of social mobility between income strata

	m	Serie (A) 1996-2005	Serie (B) 2006-2016	$\Delta Y_{l,m}$	$T_{l,m}$	Serie completa 1996-2016
1	ALTO - ALTO	0.11902 0.03096 0.26012	0.06893 0.26001 377.199	-0.05009	-0.42084	0.09398 0.14549 154.811
2	ALTO - MEDIO	0.14998 -0.06006 -0.40045	0.32894 -0.28001 -0.85124	0.17896	119.325	0.23946 -0.17004 -0.71007
3	MEDIO - ALTO	0.08992 0.08900 0.98978	0.04893 0.14037 286.863	-0.04099	-0.45583	0.06943 0.11468 165.190
4	MEDIO - MEDIO	0.17892 0.01011 0.05651	0.18930 -0.10038 -0.53026	0.01038	0.05801	0.18411 -0.04513 -0.24515
5	MEDIO - BAJO	0.18903 -0.05935 -0.31396	0.08892 0.13002 146.222	-0.10011	-0.52960	0.13898 0.03534 0.25427
6	BAJO - MEDIO	0.12968 0.01376 0.10610	0.21894 -0.16291 -0.74409	0.08926	0.68828	0.17431 -0.07458 -0.42784
7	BAJO - BAJO	0.14344 -0.14344	0.05603 -0.05603	-0.08741	-0.60940	0.09974 -0.09974

The absolute time variations between series are ΔYl, m; The relative temporal variations Tl, m, where:

$$T_{l,m} = \frac{\Delta Y_{l,m}}{Y_{l-1,m}} = \frac{Y_{l,m}}{Y_{l-1,m}} - \frac{Y_{l-1,m}}{Y_{l-1,m}} = \frac{Y_{l,m}}{Y_{l-1,m}} - 1$$

Source: National Institute of Statistics (National Employment Survey, November 1996 and 1997, Household Survey - Measurement of Living Conditions Program, November - December 1999, 2000, 2001 and 2002 and Survey of Households 2003-2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012, 2013, 2014, 2015 and 2016).
Elaboration: Own.

5. Final Considerations

Social mobility can be defined generically as any change over time in the social and economic attributes of a subject, be it a person, a home or a social group, implies a change in structure, poverty, inequality and social mobility they are phenomena that are definitely linked. Societies where poverty levels are high and inequality reaches the population as a whole among the different strata of society, there will be mobility among its inhabitants, also when economic opportunities and human development favor small groups of society, very likely that poverty and inequality are persistent and high.

The structural change that favored the reduction of poverty, especially extreme and slightly inequality, was the boom in income from gas and minerals. For this the

first important measure for the new configuration of income for the Bolivian economy was the nationalization of hydrocarbons, 2006. The measures of nationalization of the strategic sectors and in particular of hydrocarbons, have meant the state capture of the surplus that rebounded positively in the state budget and its distributive effects improved the welfare of Bolivians.

The favorable external context that promoted the growth of the product was added to them, due to this, the increase in the prices of minerals, as well as the exports of soybeans and their derivatives. This meant a significant increase in fiscal revenues that experienced an upward dynamic and a budget surplus and accumulation of Net International Reserves (NIR). According to the methodology used by the World Bank, the bonanza allowed Bolivia to move from low income to a country with low-middle income.

The contribution of the National Minimum Wage (SMN) to the improvement of salaries, especially unskilled labor and technical branches, was substantial during the boom period, and this served to improve the income of families Those who received low wages, remittances (transfers) from abroad of Bolivian migrants abroad, had a positive impact on welfare. The cancellation of the debt due to the renegotiation with the different relief programs since the 90s also meant slack of income and elimination of the budgetary restriction of payment of debt and allowed with that important amount of money destined to programs of relief and reduction of poverty since 2006.

Poverty between 1996 and 2006 in the ex ante period to the bonanza was reduced only -5 percentage points in a decade. In the case of extreme poverty only -3 percentage points and in general the reduction of moderate and extreme poverty was very slight. Apparently the slight reduction of moderate and extreme poverty was due to the slow implementation of the institutional reforms undertaken in Bolivia of first and second generation, the moderate economic growth, the restriction of fiscal revenues, the slight reduction of poverty occurs in greater intensity in the urban area with respect to the rural one.

Poverty between 2006 and 2013 in the bonanza period was -21 percentage points in a decade. In the case of extreme poverty it was -19 percentage points, so it can be concluded that the reduction of moderate and extreme poverty in the raw material bonanza was important and significant. Certainly the bonanza brought with it a substantial advance in terms of moderate but more significantly extreme poverty reduction, due first to the growth of the economy and its effect distribution, improvement of wage income, increase in employment, sustained increases in the minimum wage, conditional transfers, and increase in remittances from Bolivian migrants abroad.

In the period Ex post to bonanza the percentage of people living below the moderate poverty line remained unchanged and static between 2013 and 2016 represented 39 percent of the population, in terms of extreme poverty among 19 and 18 percent of the population is indigent. Apparently the reduction of moderate and extreme poverty remained static and without significant changes, in the period ex post to the bonanza, considering that the international prices of raw materials gas and minerals are down and the two markets of destination of Gas exports will reduce purchase volumes, as in the case of Argentina, and with Brazil there will be a renegotiation of contracts. In the medium term, the prospects for Bolivia's reduction in poverty are uncertain.

In the ex ante period to the bonanza income inequality measured by the Gini coefficient was high with respect to international standards 0.59 for 1996 and 2006 and this level of inequality was behind those registered in Brazil and Chile, in a decade this indicator had not changed substantially. At urban level income inequality increased from 0.51 in 1996 to 0.53 in 2006 due to wage heterogeneities in the labor market, this phenomenon was also similar at the rural level of 0.61 in 1996 rose to 0.64 in 2006. This reflects that income disparities, heterogeneous salary allocations and their accumulation form, were inequitable and did not undergo significant changes between 1996 and 2006. In the boom period, the increase in the national minimum wage , the government decision not to receive a remuneration higher than that of the president of the State, the income distribution effect, the conditional transfers among others generated a decrease in the Gini coefficient from 0.59 in 2006 to 0.48 in 2013, -11 points were reduced inequality at the national level, at the urban level also the inequality was reduced by -11 points, from 0.53 in 2006 to 0.42 in 2013, at rural level from 0.64 to 0.53 between the 2006 and 2013 registering a reduction also of -11 points in the boom period. In the ex post period of the bonanza, the national Gini reached 0.48, the urban Gini reached 0.41 and the rural 0.51, reflecting the fact that income inequalities and their heterogeneities are a pending agenda problem to be solved.

Social mobility refers to a change in structure, between 1996 and 2006, ex ante period to the bonanza that there was no mobility in the level of income in the strata of study and the probability of change and mobility in the strata analyzed was almost null in a decade, 0.20 in 1996 and 0.21 in 2006, correspondingly the incidence of moderate monetary poverty. The economic theory in this scenario establishes that in a scenario of low mobility, high poverty and high inequality the economic opportunities for families are scarce, a few take advantage of these opportunities tend to transfer between families, and society presents a high discrimination with social exclusion, the income level is low and consequently there is a low accumulation of capital.

In the boom period, the results of the estimations show a mobility of structural, ascending social type due to the improvement in the distribution of income, certainly the economic growth, its distribution effect, the improvements in the national minimum wage, the remittances , and the contribution of the tertiary sector of the economy improved the income of the head of the household and mobility in the boom period experienced a relative rise from 0.21 in 2006 to 0.23 in 2013, that mobility coincides with reductions in the incidence, gap and severity of poverty and the relative decline in inequality. In the period Ex post to bonanza after 17 years social mobility reaffirms its structural characteristic of ascending type and its probability of 0.23 in 2013 reaches 0.27 in 2016, it is certainly an interesting change, although poverty indicators and inequality have not undergone significant changes.

A progressive trend is evidenced in the indicator calculated with the Dang et.al (2014) methodology, which shows an increasing trend of the indicator of social mobility in the study period (1996-2016), which manifests as structural mobility upwards from the bonanza period and is best expressed in the ex post period to the bonanza, the same that is explained by the relative position of the income of the individuals, without interference of any effect (for example price), whenever this ordering is given by the probability of belonging to a particular stratum (high, medium or low, distribution effect).

The trend of the indicator of social mobility is not homogeneous, but differentiated between strata, the trend of the estimation of social mobility differentiated by income strata, reflects a reduction of social mobility in the upper stratum, and an upward trend and increases in low and medium strata, this is based on a new configuration and income stratification that began in 2006, due to the boom, the expansive economic cycle and the growth of the economy experienced between 2006 and 2016, played an important role the distribution of the surplus, the improvement of the individual income and other variables explained extensively. The low income strata experienced a significant increase mainly due to the increase of the SMN, which increased the income of the less qualified employees, in the high income stratum the reduction was systematic and significant and the stratum of average income was the one that on average increased significantly shaping Bolivian society as a middle-income society. Certainly, the improvement of household income is better expressed in the urban area, this is related to the reduction of urban poverty, but the great pending task: the improvement in rural income levels.

Finally, if mobility is seen as a whole (1996-2016), its tendency is moderate, it is slow and progressive, it is more intense in the ex post period, and it is marked by a reduction in the high stratum of income, significant and important increase of the middle stratum, rise and significant increase in the low income stratum.

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Annex

Table 1
Welfare Indicators (1996-2015)

Indicators	1996 (1)	1997 (1)	1999	2000	2001	2002	2003-2004	2005	2006	2007	2008	2009	2011 (*)	2012 (*)	2013 (*)	2014 (*)	2015 (p)
Bolivia																	
Incidence of moderate poverty (%)	64,8	63,6	63,5	66,4	63,1	63,3	63,1	60,6	59,9	60,1	57,3	51,3	45,1	43,3	38,9	39,1	38,6
Indigenous	n.d.	n.d.	73,1	76,0	69,4	71,0	70,1	67,9	69,3	66,5	64,6	58,6	56,7	58,1	54,2	50,0	49,9
Non Indigenous	n.d.	n.d.	45,1	54,1	51,9	53,3	49,1	49,7	46,0	51,8	46,0	41,5	37,3	34,0	29,5	31,6	31,9
Incidence of extreme poverty (%)	41,2	38,1	40,7	45,2	38,8	39,5	34,5	38,2	37,7	37,7	30,1	26,1	21,0	21,6	18,7	17,2	16,8
Indigenous	n.d.	n.d.	50,6	56,1	46,0	48,7	42,0	47,4	48,8	47,4	37,7	33,0	33,7	36,8	33,0	27,5	26,8
Non Indigenous	n.d.	n.d.	21,8	31,1	25,9	27,5	19,4	24,2	21,3	25,2	18,3	16,7	12,4	12,1	9,8	10,0	11,0
Gini Index (A)	0,59	0,59	0,58	0,62	0,59	0,60	n.d.	0,60	0,59	0,56	0,52	0,50	0,47	0,47	0,48	0,48	0,47
Percentile 90/Percentile 10 (3) (B)	31,2	22,2	32,4	51,0	25,1	27,0	13,5	30,5	23,6	19,0	13,9	14,7	11,4	12,7	11,5	11,6	10,3
Decil 90/Decil 1 (4) (C)	113,4	96,3	142,5	234,0	169,4	149,6	46,0	127,5	97,2	79,6	58,0	59,9	36,1	47,7	41,8	39,5	37,2
Urban Area																	
Incidence of moderate poverty (%)	51,9	54,5	51,4	54,5	54,3	53,9	54,4	51,1	50,3	50,9	48,7	43,5	36,8	34,7	28,9	30,5	31,0
Indigenous	n.d.	n.d.	60,8	62,2	59,1	60,5	61,7	56,2	58,9	55,6	53,9	46,9	42,2	40,3	33,8	33,7	35,7
Non Indigenous	n.d.	n.d.	40,7	48,2	48,2	48,1	43,7	46,0	42,1	46,9	43,6	40,4	34,8	33,0	27,4	29,4	29,5
Incidence of extreme poverty (%)	23,7	24,9	23,5	27,9	26,2	25,7	22,9	24,3	23,4	23,7	18,9	16,1	10,8	12,2	9,1	8,3	9,3
Indigenous	n.d.	n.d.	30,2	34,1	29,3	31,6	29,0	29,4	31,1	29,0	23,2	17,4	15,0	16,7	13,3	10,1	12,7
Non Indigenous	n.d.	n.d.	15,9	22,9	22,2	20,5	14,1	19,4	16,0	19,1	14,7	14,8	9,2	10,8	7,8	7,6	8,2
Gini Index (A)	0,51	0,52	0,49	0,53	0,53	0,54	n.d.	0,54	0,53	0,51	0,46	0,45	0,41	0,42	0,42	0,44	0,42
Percentile 90/Percentile 10 (3) (B)	9,5	10,1	9,8	11,1	10,1	10,4	8,1	10,7	10,3	9,7	8,1	7,1	6,6	7,3	7,0	6,6	6,6
Decil 90/Decil 1 (4) (C)	28,3	31,8	27,6	36,4	42,7	37,0	24,4	34,9	32,6	25,0	23,2	22,5	15,9	17,9	17,3	18,1	17,2
Capital city (2)																	
Incidence of moderate poverty (%)	48,4	50,7	46,4	52,0	50,5	51,0	52,8	47,5	46,0	48,0	48,0	42,9	33,8	32,7	25,6	29,3	29,1
Indigenous	n.d.	n.d.	56,7	60,5	55,1	58,8	61,0	53,4	56,3	54,1	53,3	47,1	39,0	38,6	29,0	31,3	32,8
Non Indigenous	n.d.	n.d.	35,4	45,5	44,7	44,1	40,6	41,8	37,3	42,6	42,9	38,8	32,0	31,2	24,8	28,7	28,1
Incidence of extreme poverty (%)	20,9	21,3	20,7	25,7	22,3	23,9	21,7	21,8	21,1	21,9	17,6	16,5	9,3	11,6	7,5	8,3	8,1
Indigenous	n.d.	n.d.	27,1	32,2	25,0	30,8	28,1	26,2	28,4	27,1	22,6	19,3	12,8	16,2	9,9	9,7	9,8
Non Indigenous	n.d.	n.d.	13,9	20,6	18,8	17,9	12,0	17,6	14,9	17,4	13,0	13,8	8,1	10,4	6,8	7,9	7,6

Indicators	1996 (1)	1997 (1)	1999	2000	2001	2002	2003-2004	2005	2006	2007	2008	2009	2011 (*)	2012 (*)	2013 (*)	2014 (*)	2015 (p)
Rural Area																	
Incidence of moderate poverty (%)	84,4	78,0	84,0	87,0	77,7	78,8	77,7	77,6	76,5	77,3	73,6	66,4	61,9	61,2	59,9	57,5	55,0
Indigenous	n.d.	n.d.	85,8	89,8	81,4	81,9	80,7	80,8	80,4	78,9	76,6	73,2	69,0	70,5	70,3	63,9	62,3
Non Indigenous	n.d.	n.d.	72,1	78,0	64,1	70,2	66,4	65,5	62,2	72,4	59,2	45,9	48,2	39,5	39,4	42,8	42,9
Incidence of extreme poverty (%)	67,8	59,0	69,9	75,0	59,7	62,3	53,7	62,9	62,2	63,9	51,5	45,5	41,8	41,1	38,8	36,1	33,3
Indigenous	n.d.	n.d.	71,8	78,3	65,7	66,7	58,3	67,6	67,6	68,2	54,1	52,6	49,6	50,8	48,6	42,3	39,2
Non Indigenous	n.d.	n.d.	57,5	64,3	38,1	50,1	36,4	45,2	42,8	50,6	38,7	24,1	26,6	18,9	19,4	22,3	23,4
Gini Index (A)	0,61	0,63	0,64	0,69	0,64	0,63	n.d.	0,66	0,64	0,64	0,56	0,53	0,54	0,54	0,53	0,53	0,52
Percentile 90/Percentile 10 (3) (B)	24,7	25,3	34,1	44,5	33,1	41,5	16,8	34,6	24,9	34,5	22,5	24,2	17,8	27,6	17,4	17,0	16,7
Decil 90/Decil 1 (4) (C)	79,3	108,7	132,6	186,6	447,4	175,2	53,2	156,9	130,3	166,8	80,0	76,0	59,8	90,9	63,5	56,9	63,4

Source: National Institute of Statistics (INE) (National Employment Survey, November 1996 and 1997; Household Survey - Measurement of Living Conditions Program, November-December 1999, 2000, 2001 and 2002 and Household Survey 2003-2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012, 2013, 2014, 2015).
(1) Includes Capital Cities of the Department and El Alto.
(2) Per capita income equal to zero (0) is excluded for the calculation of the Gini.
(3) When classifying the population into 100 groups of equal size, this indicator corresponds to the ratio of the 90th percentile to the 10th percentile and decile 1.
(p) Preliminary.
(*) The expansion factor calculated by the INE contemplates the population projections based on the 2012 Population and Housing Census.

Definition of Indicators

Incidence of Poverty: Percentage of the population that is below the poverty line which is calculated based on a minimum income required to satisfy basic needs. Incidence of Extreme Poverty: Percentage of the population whose total income is so low that even if it is exclusively dedicated to food, it will not meet the minimum nutritional requirements. Gini Index: Measures how unequal a society is. While closer to 1, society is more inequitable, and the opposite occurs if the indicator is close to 0. Both the Percentile 90 / Percentile 10 ratio and Decil 10 / decile 1 ratio are expressed as the richest 10% ratio between the 10% poorer.

Table 2
Measurements of poverty 1976-2002

Source	Analysis Unit	Welfare Indicator	1976	1986	1989	1990	1991	1992	1993	1994	1995	1996	1997	1999	2000	2001	2002
									Unsatisfied Basic Needs								
INE (2001)	Household Members	Unsat. Basic Needs	66.3					53.1								39	
									Moderate Poverty Line								
CEPAL (2002)	Households	Adj. Incomea			49.4					45.6			46.8	42.3			
Pereira and Jimenez (1998)	Households	Adj. Incomea				53.3	49	51.2	49.1	45.1							
Jiménez and Yañez (1997)	Households	Adj. Incomea				53.3	49	51.2	49.1	45.1	47.8						
Gray-Molina et al (1999)	Households	Adj. Incomea				53.3	49	51.2	49.1	45.1	47.8						
Antelo (2000)	Households	Adj. Incomea				53.3			49.1				46.9				
UDAPSO (2005)	Households	Consuption Exp.			52.9	55.2		53.3									
World Bank (1996)	Households	Consuption Exp.			51.6				52.6								
Vos et al. (1998)	Household Members	Income			70.8				56.9		59.3						
Jiménez and Landa (2004)	Household Members	Income											50.7	46.4	52	50.5	51
Wodon (2000)	Household Members	Adj. Incomeb		70	73.6			73.4			75.5	64.5					
Psacharopoulos et al. (1993)	Household Members	Adj. Incomec		51.5	54												
Hernani et al (2001)	Household Members	Adj. Incomea			59.7								52.4				
World Bank (2000)	Household Members	Adj. Incomea							52				50.7	48.5c			
Vos et al. (1998)	Household Members	Consuption Exp.			60.9				60.3								
World Bank (1996)	Household Members	Consuption Exp.			60.1				61.6								
									Extreme Poverty Line								
CEPAL (2002)	Households	Adj. Incomea			22.1					16.8			19.2	16.4			
Pereira and Jimenez (1998)	Households	Adj. Incomea				26.2	21.1	24	22.3	17.9							
Jiménez and Yañez (1997)	Households	Adj. Incomea				26.2	21.1	24	22.3	18	20.8						
Gray-Molina et al (1999)	Households	Adj. Incomea				26.2	21.1	24	22.3	18	20.8						
Antelo (2000)	Households	Adj. Incomea				24.5			20.9				19.3				
World Bank (1996)	Households	Consuption Exp.			21.8				22.4								
UDAPSO (2005)	Households	Consuption Exp.						23.1									

Source	Analysis Unit	Welfare Indicator	1976	1986	1989	1990	1991	1992	1993	1994	1995	1996	1997	1999	2000	2001	2002
Vos et al. (1998)	Household Members	Income			46				30		32.2						
Jiménez and Landa (2004)	Household Members	Income							23.7				21.3	20.7	25.7	22.3	23.9
Wodon (2000)	Household Members	Adj. Incomeb		41.2	52			42			46	32.3					
Psacharopoulos et al. (1993)	Household Members	Adj. Incomec		22.3	23.2												
Hernani et al (2001)	Household Members	Adj. Incomea			29.3								23.3				
World Bank (2000)	Household Members	Adj. Incomea							25.5				21.5	22.5d			
Vos et al. (1998)	Household Members	Consuption Exp.			27.9				28.3								
World Bank (1996)	Household Members	Consuption Exp.			28.1				29.3								

Source: Klasen Stephan et. al. (2004), Velasquez, Iván (2007)
Notes:
a) Incomes are adjusted according to the methodology of CEPAL (1995).
b) The adjustment factor is equal to the ratio of consumption expenditure per capita from the national accounts to the mean income per capita from the LSMS.
c) The adjustment factor is equal to the ratio of GDP (taken from the national accounts) to aggregate household income (estimated from the LSMS).
d) Arithmetic mean of the poverty indices estimated from the LSMS of March 1999 and Nov. 1999. The welfare indicator of the LSMS of Nov. 1999 is consumption expenditure per capita

Table 3
Components of the Unsatisfied Basic Needs

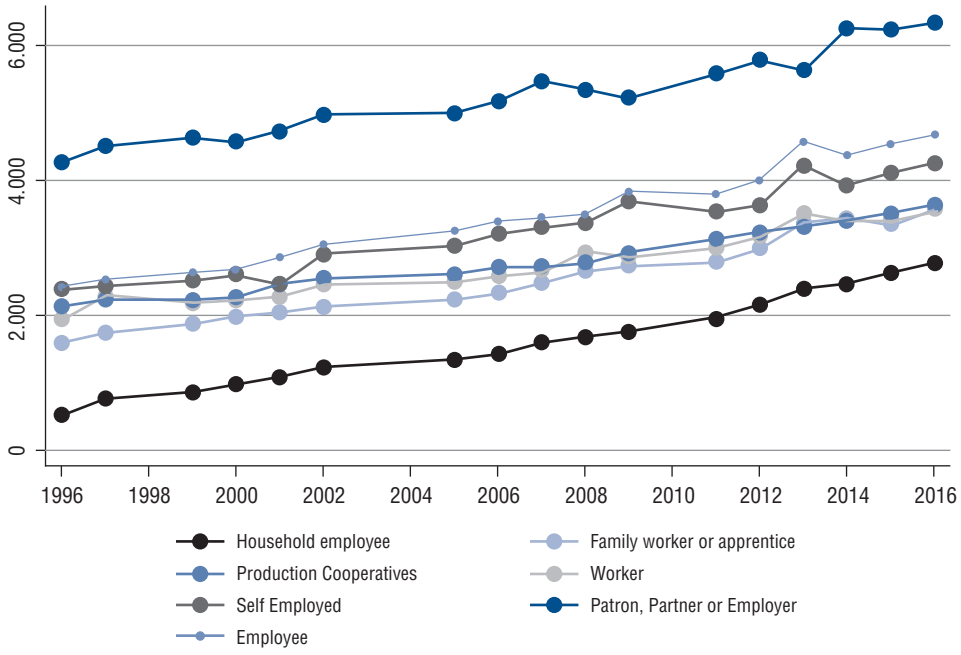
Housing	Housing Building Materials
	Space Availability
Services and Basic Supplies	Sanitation
	Energy Supplies
Education	School backwardness
Health	Institutional Support

Table 4
Components of the Unsatisfied Basic Needs Index

Condition of Poverty	Tour of the NBI Index
Satisfied Basic Needs	-1 < NBI<-0,1
Poverty line	-0,1 < NBI<0,1
Moderate Poverty	0,1 < NBI<0,4
Indigence	0,4 < NBI<0,7
Marginality	0,7 < NBI<1

A. Income Estimation –Conceptual Note-

Graph 1
Income for occupation condition (1996-2006)



In order to carry out the quantifications of poverty, inequality and social mobility it was necessary to define the income variables to be used. The income of the household is divided into two types of income: labor income and non-labor income, labor income is taken into account the income of the salaried worker in its main activity this corresponds to the liquid income in normal hours of salaried workers, workers , employees, employers, partners or employers who do receive salaries and domestic employees. The extra earnings of the salaried worker are composed of bonuses, production bonuses, year bonuses, commissions, overtime income, breastfeeding or prenatal subsidy and birth certificate, among other linked. In relation to the income in kind of salaried work, these include: food and beverages, transportation, clothing and footwear, housing or accommodation and others such as day care services. In the income of the independent worker, one must consider the gross income corresponds to the total income of his main occupation, for those who are self-employed, employer, partner or employer that does not receive salary and cooperativist.

The net income of the independent worker will be the discounted income from the obligations (salaries, purchase of materials, etc.) for the use of the home. The income of the salaried worker in his secondary activity is also considered. This corresponds to the liquid income in normal hours of salaried workers, employees, employers, partners or employers who do receive a salary, in addition to those employed by the household. To consider the income of the salaried employee for overtime, this income is composed of the payment for overtime, bonus or production premium. This is also considered the income in kind of wage labor, consisting of: food, transportation, clothing, housing, accommodation and others. With respect to the income of the independent worker in his secondary activity, the gross income is considered for those who are self-employed, employer, partner or employer that does not receive salary and cooperativist. The net income of the independent worker will be the income once all the obligations have been paid (salaries, purchase of materials, etc.) for the use of the home.

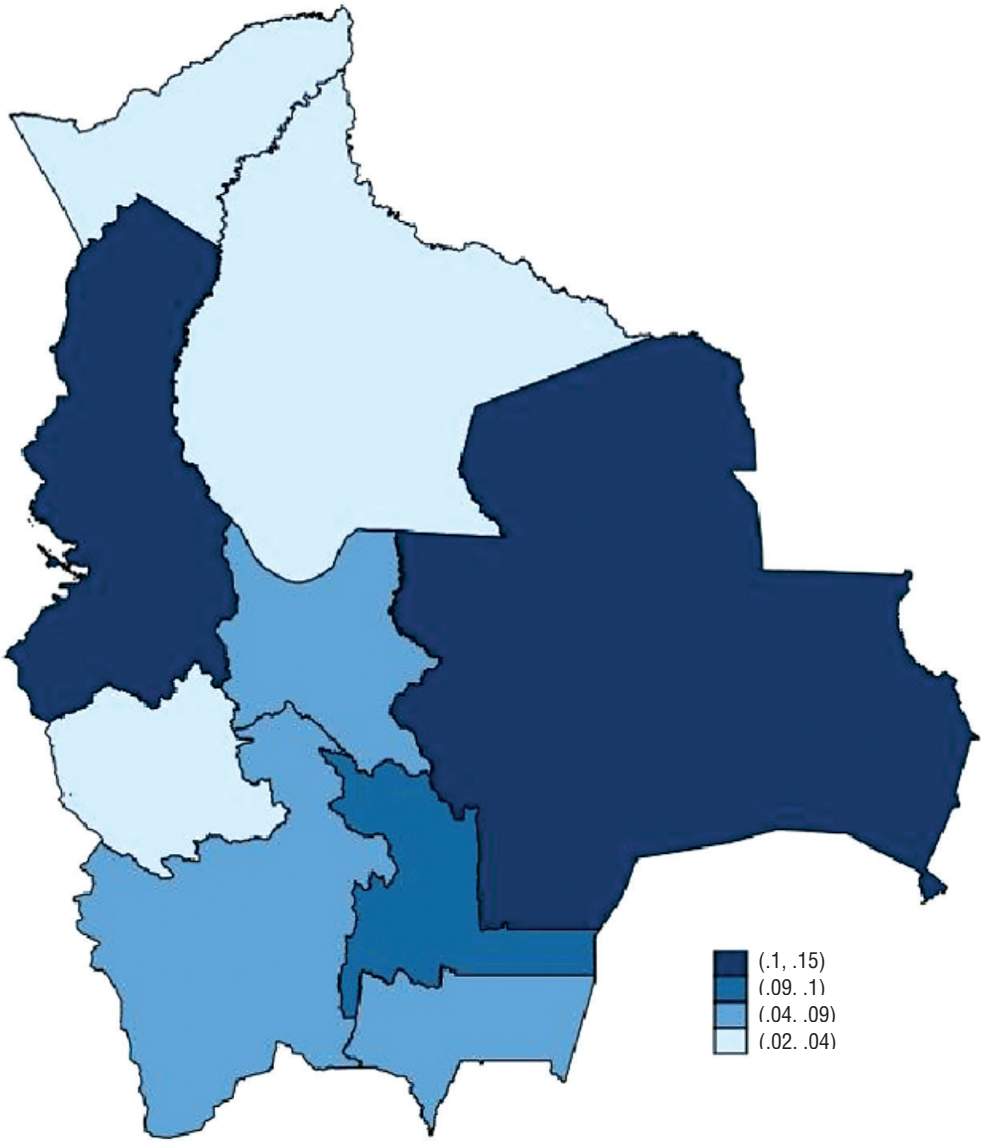
In relation to non-labor income, income is included for social security, which includes retirement income, merit, disability, widowhood, orphanage and other income. Of the property income, they contain interest income from bank deposits, loans, rental of properties of real estate or houses, rentals of agricultural property, dividends, business profits or withdrawals of companies and leases of machinery and / or equipment. Income from intra-household transfers is income from family assistance due to divorce or separation, monetary or in-kind transfers of persons residing in the country. Government transfers such as Renta Dignidad and Bono Juancito Pinto, Bono Juana Azurduy are also taken into account. Other non-labor income includes income from compensation for work, insurance, and other extraordinary income such as scholarships, copyrights, trademarks and patents. The detail described above allows accounting for all household income, and with it being able to evaluate the income corresponding to each member in order to evaluate, the indicators of poverty, inequality and social mobility.

Delimitation of income strata (high, medium, low)

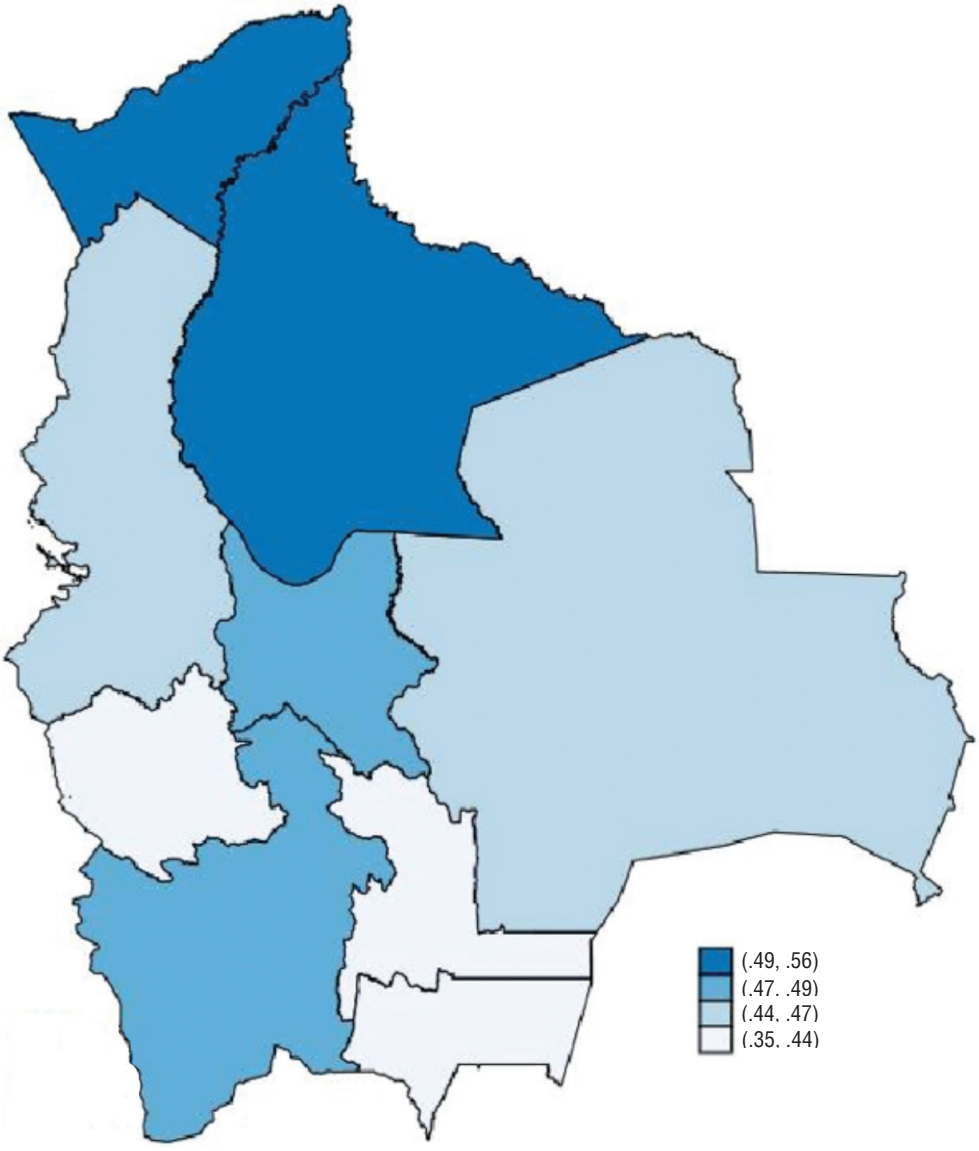
The Organization for Economic Cooperation and Development (OECD) generates - from a practice and based on statistical regularities, the stratification of income into: high, medium

and low, having the lowest income class contains individuals with an income less than 50 percent of the median of the total population, the middle class covers all individuals with a net income between 50 and 150 percent of the median income, the upper class of income identifies all individuals with an income greater than 150 percent of the median.

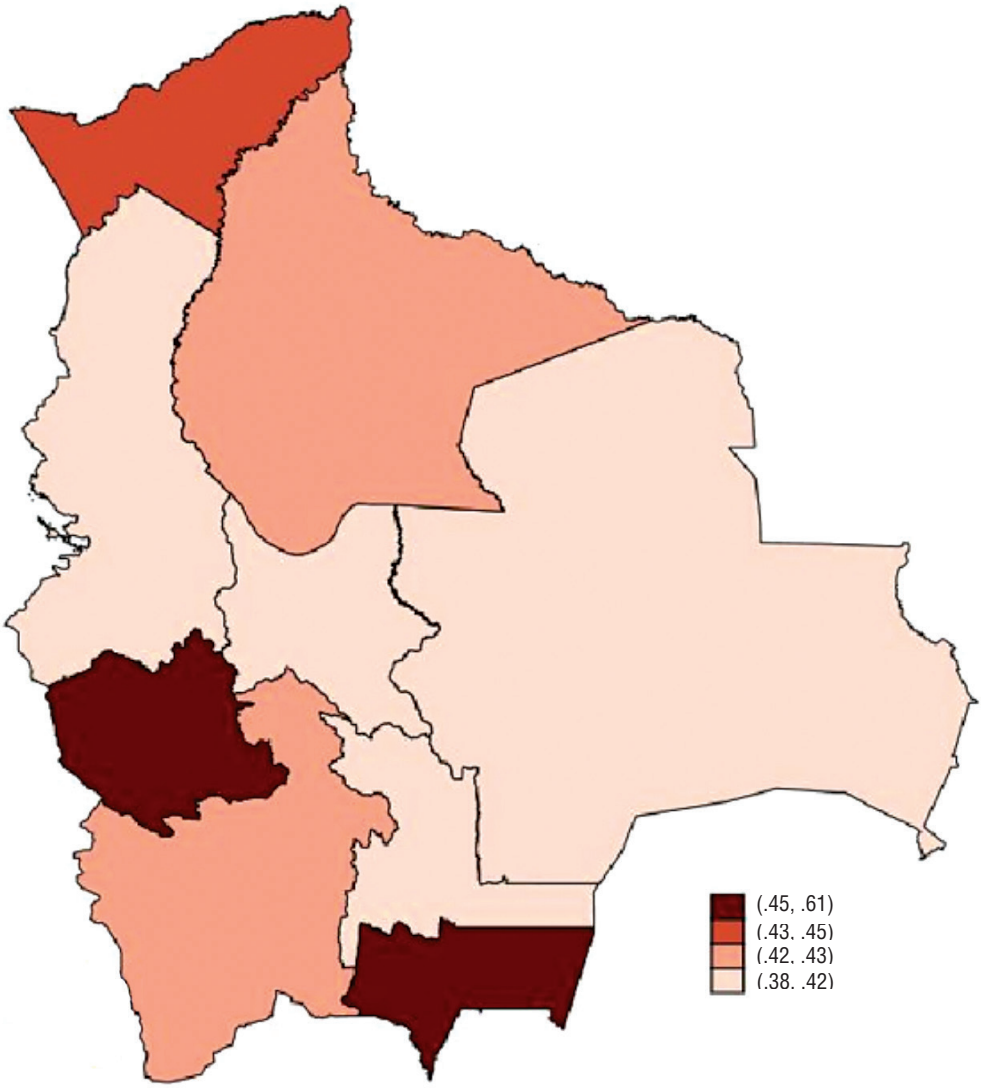
Map 1
Proportion of people with high incomes, by department



Map 2
Proportion of people with average income, by department



Map 3
Proportion of people with low income by department



Inequality, satisfaction and redistribution. Citizens' perceptions of inequality and development in the Andean region[1]

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Abstract

It is known that economic and social inequality has been decreasing during the last 20 years in most of Latin America, and that the countries of the Andean region have been the scene of some of the most accentuated changes. What we do not know is how people understand these change and what are the expectations that are created among citizens in relation to the actions of the government and society to reduce inequalities. This research work focuses precisely on the perceptions that citizens have about inequality and other issues that, like subjective well-being, are directly linked to it. For this, data from the main public opinion surveys carried out in the country (LAPOP, the Latino-barometer and the World Values Survey) are analyzed to account for the evolution of perceptions on these issues, discussing their relationship with the evolution of objective indicators of inequality and quality of life, both at the national level and at the subnational level.

Key Words: Inequality, public opinion, development, Andes.

1. Introduction

Latin American societies have shown a tendency to reduce social and economic inequalities that are particularly important in the Andean region. During the last 15 years, indicators of economic inequality have shown a decreasing trend in the countries

1 An earlier version of this work was presented at the Congress of the Latin American Association of Political Science in Montevideo, Uruguay, in July 2017. This work initially arises within the framework of a research line on inequality of citizenship, Social Studies Community and Public Action in partnership with OXFAM in Bolivia; the initial work was elaborated with the support of Ilze Monasterio and received valuable comments from Verónica Paz Arauco, Boris Branisa, Armando Ortuño, Roberto Laserna and Vivian Schwarz, as well as members of Citizenship. Errors and omissions are the responsibility of the author.

of the region. But in addition, important advances have been made in the symbolic construction of a community of equal rights for citizens, a basic condition for modern democracies[2]. According to most of the indicators developed by both government institutions and international entities, the countries of the Andean region have made progress in building a less unequal society[3].

This research focuses on an unexplored field of inequalities: the perceptions that citizens have about inequality and the action that the government should have on it. Three complementary hypotheses guide the investigation. In the first place, the objective reduction of inequality in the countries of the region should be reflected in changes in the perceptions of citizens about inequality and its political implications. The second, suggests that inequality has relevance beyond its normative dimension, and therefore has implications for factors related to the quality of life - or living well in these societies. The third working hypothesis is based on the recognition of the political nature of the understanding of inequality and associated policies to fight it, and suggests that there is a symbolic dimension that is important when understanding what citizens think about inequality (and about the way in which it should be faced).

To discuss these hypotheses, the paper proposes an analysis of a survey on public opinion data, which takes place at the aggregate level, with the countries and their national averages as units of analysis, as well as at the individual level, applying multivariate statistical analysis tools to identify the relationships between the different variables with individuals as units of analysis. The data used comes from the databases of the main surveys of public opinion and political culture that are carried out in the region, those of the Public Opinion Project of Latin America, LAPOP, the World Values Survey, EMV, and the of the Latino barometer [4]. These information sources (LAPOP, Latino barometer, EMV) are public and available to researchers who require them in the respective web pages of the international projects[5]. The annex of the document includes the procedures for recoding and analyzing the data, as well as the list of variables used in the different statistical models used in the analysis.

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2 This phenomenon has been mainly relevant in Bolivia, but has also been important in Peru and Ecuador, countries in which society has maintained strong features of exclusion inherited from the colonial past and its form of social stratification based on the ethnic origin of the people.

3 On the subject see, among others, the latest reports on Human Development in Bolivia (UNDP, 2010, 2015), the one on Latin America (UNDP, 2016) or specific studies of the World Bank, ECLAC and other international entities (ECLAC, 2015 Lustig & Lopez-Calva, 2010; Lustig, Lopez-Calva, & Ortiz Juarez, 2011).

4 The annexes of the document include a brief description of each of the sources used, as well as the exact presentation of the questions used in the surveys.

5 The LAPOP data can be found at www.lapopsurveys.org; those of the Latinobarómetro at www.latinobarometro.org; those from the World Values Survey at www.worldvaluessurvey.org, although data from Bolivia, the first country in round 7 of the project, are not public yet.

2. Inequality and citizen perceptions

The first topic of interest of this research is the perception about the income distribution of Latin Americans, in particular of those who live in countries of the Andean region. What we seek to know is whether the perception of this issue has varied following a specific and consistent trend with economic changes. The available data show that objectively measured inequality has been reduced significantly in the region since the end of the last century to the first half of the decade of 2010.

International sources of information such as the UNDP and the World Bank show that inequality has been reduced objectively in all the countries of Latin America in the period between 2003 and 2013 (UNDP 2016). In the countries of the Andean area, inequality has been reduced more rapidly than in the Latin American average. In 4 of the 5 Andean countries, the reduction in the Gini coefficient has been greater than the regional average, only Colombia shows a reduction in inequality lower than the Latin American average[6].

Inequality, then, has been reduced objectively in the region. This has to do with a process of urbanization and expansion of the middle classes (on the topic see for example Paramio & Grynspan, 2012), as well as a significant reduction in the proportion of poor people in the region. In the same period, the income growth of the poorest sectors has been greater than the growth of the income of the rest of society, which shows us an inclusive process of economic growth and reduction of inequality (UNDP 2016).

It is important to emphasize that inequality in itself is not necessarily a problem, as it can result from different expectations and efforts; To put it in terms of Amartya Sen, inequality does not necessarily result from an inequality of opportunities that generates inequality in the abilities of the subjects ((Sen, 1992)), but it can be associated with variations in the priorities and values of individuals. It seems more important, then, to think about the normative evaluation that citizens make about the inequality existing in the country rather than their perception of inequality itself.

Therefore, for a public opinion researcher, it would not make much sense to explore the perceptions of inequality itself. How unequal is the country, is something that has nothing to do directly with perceptions, but with the economic and social structure of a country. That is why there is no direct question about the perception of inequality in the instruments of measurement of public opinion available at the international level, and it is not clear what its meaning would be in conceptual terms and much less normative.

The central question for an analysis of perceptions about inequality has to be oriented, then, to the implications of inequality in a normative field. In other words, this implies that inequality is not seen as a problem only from the perspective of the academic point of view, but from the perspective of the citizen, who understands that this objective phenomenon puts a distance between reality and what his society should be. This conflict between objective and normative reality, between what is and what should be, affects in a

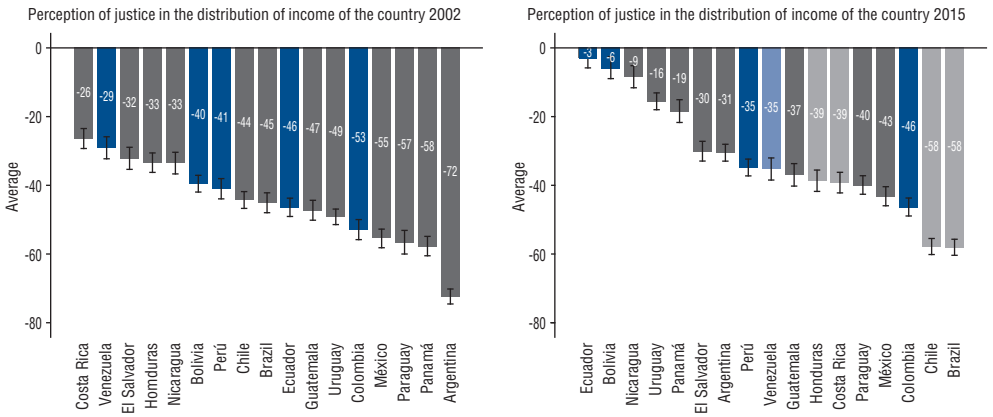
6 While the annual change of the Gini coefficient, in percentage, in Latin America has been a reduction of 1.13% in the decade between 2003 and 2013, in Venezuela the change has been -2% per year, -1, 83% in Bolivia, -1.67% in Peru, -1.36% in Ecuador and -0.17% in Colombia (UNDP 2016 with data from the World Bank and CEDLAS).

negative way the quality of life (as we will see later), if we consider an integral concept of living well that also incorporates the normative dimension. And this implies to understand the interdependent character of inequality that manifests itself in a plurality of forms and spaces, in which the aspirational or normative aspect is not exempt.

One way to operationally address this issue is to ask about the level of justice that people perceive in the distribution of income in each country. The data of the Latin barometer allow, in some of its rounds, to observe the valuation that people do about the level of justice in the distribution of income. The general trend for Latin America is consistent with the reduction of inequality in objective terms: citizens, on average, believe that the distribution of income in their countries is fairer now, than it was at the beginning of the century.

The following graphs show the evolution of the national average in the answers to the question about justice in the distribution of income: How fair do you think the distribution of income in the country is? The following graphs show the averages for the different countries in Latin America in 2002 and in 2015,[7] which are the years that the Latin barometer database includes this question. The countries in the Andean area are highlighted in blue and the countries in which the average value of justice in the distribution of income has decreased (in Brazil, Chile, Costa Rica, Honduras and Venezuela, citizens with a pattern in the second graph) are highlighted. Believe, on average, that the distribution of income is more unfair now - 2015 - than at the initial point of measurement in 2002, in all other countries, the trend is the opposite).

Graph 1
Perception of justice in the distribution of income by country in Latin America, 2002 and 2015



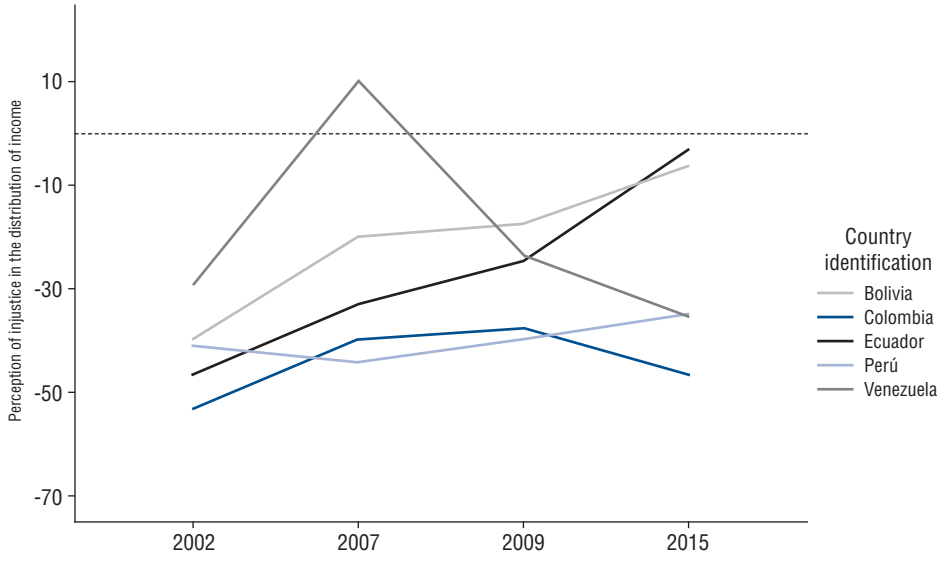
Source: Latin barometer 2002 and 2015.

7 The responses were re-coded on a scale that goes from -100, which represents very unfair, to 100 that represents very fair. The annex of the document presents more information about the transformations made in the data for its presentation analysis.

The first thing that comes to mind is that all the countries of the region in Latin America, continue to see the distribution of income in their countries as unfair (the orientation of the columns down the horizontal axis shows that). But this is not a surprise; at the end of the day we are talking about the most unequal region in the world in terms of income distribution. What is relevant is the change, which implies that a significant proportion of people in the region fail to consider that the distribution of income in the country is unfair and that they now have a more favorable opinion of it. It is relevant to know that perceptions of citizens about justice in the distribution of income have improved in general terms in Latin America. The perception of justice in the distribution of income has improved in most countries in relation to the beginning of the millennium. The Bolivian, Ecuadorian and Argentine cases are examples of a drastic reduction in the perception of inequality, while Chile, Costa Rica and Brazil show the opposite scenario[8].

In the Andean area, the evolution of perceptions has been positive in general terms, like in the rest of Latin America, but there are important nuances and differences among the countries of the region. The following graph presents the evolution of the average perception of justice in the 5 countries between 2002 and 2015.

Graph 2
Evolution of the perception of justice in the distribution of income in the countries of the Andean area, 2002 to 2015



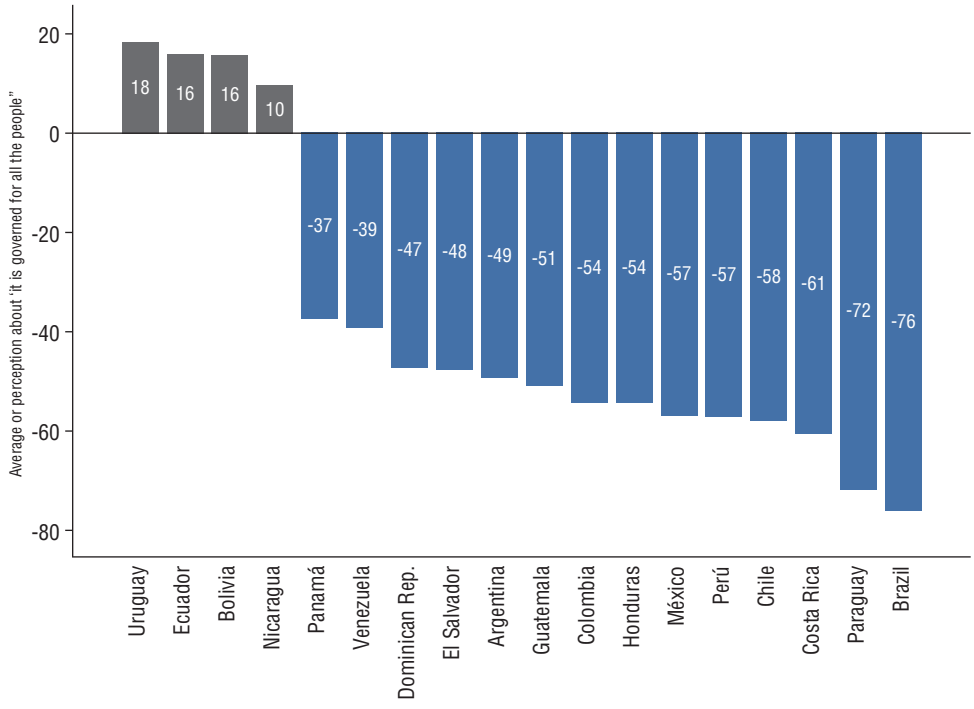
Source: Latin barometer, 2002-2015.

8 Given that the question refers to justice in the distribution of income, and not to the perception of inequality in itself, it is possible that the data are reflecting at least in part a political situation of little popularity of the national governments of the latter. 3 countries

While some countries have clear success stories (the case of Ecuador is the most interesting, but there is also the one of Bolivia), for others, the reduction of the perception of injustice is not so obvious. The evident political and economic breakdown of Venezuela is shown in the reversal of a trend that was initially very positive, but ends up losing what it had gained at the beginning of the decade. Peru and Colombia, on the other hand, show a scenario of very slight improvement in the period covered, but without the drastic aspects of the two economically smaller countries in the region.

One of the hypotheses of this paper suggests that there is an important symbolic factor associated with the perceptions and assessments that citizens make about inequality. The symbolic perception of change in the distribution of income has to do directly with the political dimension and with the closeness that individuals have to a way of doing government in which the discourse of economic growth, redistribution and the benefit of the people have a central role. If this is the case, perceptions of inequality should show a statistical relationship with citizens' political assessments. One of these assessments can be measured by the degree of acceptance of the idea that the government works for all the people and not only for the benefit of a few; the Latin barometer database is once again useful for comparing the results of the countries of the region in this variable. The following graphic presents this comparison.

Graph 3
Average perception of idea "It is governed for all the people", year 2015

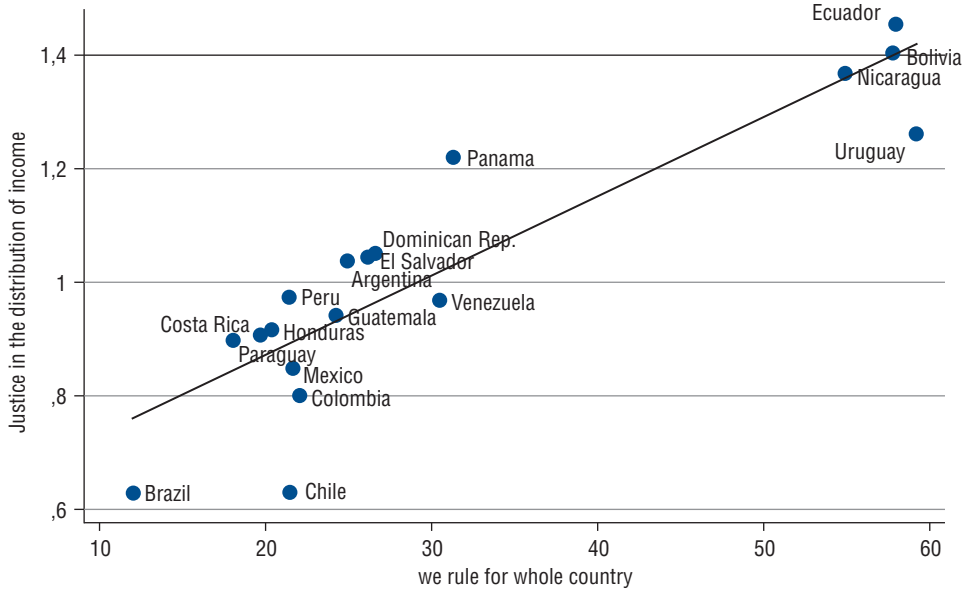


Source: Latin barometer 2015.

The perception of the fair distribution of income is associated with the existence of a leftist popular government, which governs for the general welfare and not for the particular interests of a few. Ecuador, Bolivia, Uruguay and Nicaragua are the only countries in the region where there is a perception mostly favorable to the idea that "it is governed for all the people" (versus the idea that it is governed for the benefit of a few). And of course this is not surprising; the idea of "governing for the people" is a central element of the political speech of populist governments, strongly personalized and based on the charismatic leadership of their leader, which is precisely the style of government of Ecuador, Bolivia or Venezuela[9]. But in addition, this discourse is reinforced with unobjectionable figures of economic growth, reduction of poverty and reduction of inequality that are important in relation to the regional average, resulting in a perception of popular government that goes hand in hand with a sense of economic well-being more or less widespread in the population, and that in turn results in governments that have high popular support.

The graph below shows the relationship between national averages in the question of whether it is governed for all the people with the perception of justice in the distribution of income. The correlation between both variables at the aggregate level is high (.89) and statistically significant.

Graph 4
Relationship between average perceptions of justice in the distribution of income and the idea that it is governed for all the people



Source: Latin barometer 2015.

9 On the role of charismatic leadership in the region see, among others, (Calderón & Moreno, 2013)

When the data is considered at the individual level, the relationship between the perception of justice in the distribution of income and the idea that it is governed for all the people remains strong. A multiple regression analysis, whose results are omitted here for reasons of space but that are included in the annex, shows that there is a strong, statistically significant relationship to controls between the two variables which interest us. This relationship is independent of a series of other variables included in the model as statistical controls, including the country of residence of the person, sex, age, size of the locality where he lives, approval of the presidential administration, evaluation of economics and class self-perception.

An additional piece of information allows us to think about the relationship between objective reduction of inequality and normative assessments of distributive justice. The evolution of the perception of justice in the distribution of income compared with the objective evolution of inequality indicators in one of the countries of the Andean region, Bolivia, can generate interesting interpretations.

The graph below shows the variation in the average perception of justice in the distribution of income in the country between 2002 and 2015, as measured by the Latinobarómetro. The graph also illustrates, for comparative purposes, the variation of the Gini index measured by the National Institute of Statistics of Bolivia based on national household surveys and improvement of living conditions[10].

The information shows that the average perception of the degree of justice in the distribution of income in Bolivia has improved significantly in the last twelve years. Undoubtedly, this has to do with the objective reduction of the indicators of inequality that the economic data show for the country, but it also seems to have a more political element than only an economic one.

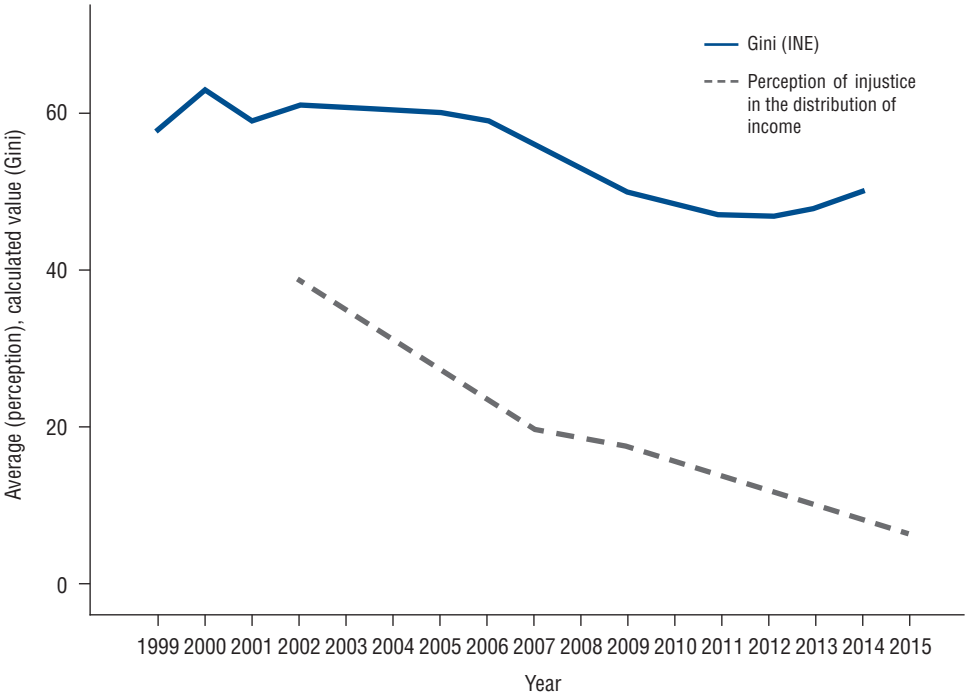
The trend recorded in the dotted line is clear and points towards the consolidation of a vision of greater justice (or at least less injustice) in the distribution of income for the majority of the population. It is relevant to take into account that in the entire period, including the year 2015 that has the lowest value of perception of injustice in the distribution of income, the average is negative in absolute terms: the distribution of income is seen more unfair than fair.

The perception of a "fairer" distribution of income distribution begins to change before the indicators of inequality are reduced, and it also does so with a more pronounced curve than the variation in economic data. In other words, the very fact that there is a leftist government with a strong redistributive rhetoric could have generated in people

10 The elaboration of this graph deserves a methodological clarification. What the graph seeks is to compare the trends between an objective measure of inequality (in this case the Gini coefficient, used for its greater knowledge by a broad audience) and a subjective measure of perception of equality (perception of justice in the distribution of entry). The original scale of the variable of perception of justice makes it impossible to calculate exact numerical averages, but the recoding and the decision to graph it in the way it is presented in the graph serves what we are interested in here: see the trend in time of the perception of injustice in the distribution of income, which clearly shows a reduction. This reduction is consistent with a decrease in objective inequality at least until 2012, but later it would seem to develop independently of the Gini. As the objective is this, the confidence intervals of both variables are also omitted, which should be used in more precise analyzes.

a perception that inequality, or at least injustice in distribution, is reduced more rapidly than what happens in the past reality[11].

Graph 5
Gini index and perception of injustice in the distribution of income in Bolivia, per year



Source: Latin barometer (perception of income injustice); INE (National Institute of Statistics) Bolivia (Gini).

However, it seems clear that the perception of injustice in the distribution of income has been reduced significantly in Bolivia and in a large part of Latin America. But in strictu sensu, perception of justice in the distribution of income is not equal to perception of inequality; that is, justice, which is what is asked in the Latin barometer survey, can exist in a scenario of inequality insofar as it has to do with the procedure from which a situation results and not from the situation itself.

11 Although different economic studies show that the determining factor for the reduction of inequality in Bolivia is the change in labor patterns in urban areas and not social bonds, (Eid, Aguirre, & Hernani Limarino, 2013; Vargas & Garriga, 2015) the redistributive rhetoric of the government together with the prevalence of a "rentier" mentality make the hypothesis that a good part of the population associates reduction of inequality with redistributive policies at least plausible.

This argument is basic to a liberal interpretation of inequality, and it is undoubtedly relevant in the discussion of this phenomenon and its theoretical and empirical causes. However, it is difficult to think that people can understand that justice has improved in the distribution of income in a context of increasing inequality (which is the counterfactual hypothesis in this case). It seems evident that the conception of justice in the distribution of material goods has to do at least with the idea of equality of opportunity rather than equality of position[12]. Still, it is important to remember that what we are evaluating here is a perception of justice in the distribution of income, and not an evaluation of inequality itself.

3. The implications of justice in the distribution of income

Why is it important for citizens to feel that the distribution of income in their country is fair? This question has an immediate normative response and has to do with the idea that justice is a desirable attribute in a society.

The discussion about what justice is and its implications is very old. The Greeks raised it from their first thinkers[13]. But it is the liberal tradition that has given more attention to the discussion of the idea of justice. The classic of Jown Rawls, A Theory of Justice, strongly marks the liberal understanding of justice, based on a social agreement in which the anonymity of individuals is presumed and by which disputes are resolved and power is administered under a "Veil of ignorance" of the identity of the subjects that participate in it (Rawls, 1971).

The contributions of Sen to the liberal discussion of justice have to do, beyond the procedural, with the militancy in the reduction of the injustice existing in the world, which is manifested in the inability of human beings to achieve the goal of life plan they want in the world. While it sets as objective the freedom to achieve the realization of individual aspirations, this is an idea of clear liberal roots, but it depends on the conditions of society to guarantee the opportunities to achieve it. Then justice in the distribution of income, both as a condition to achieve the realization of these aspirations and in the form of result of this process, is an important element of social justice understood more generally.

But in addition to the normative discussion in which justice (and distributive justice) is a good in itself, it is possible to think of other implications of the idea of distributive justice in a society. One has to do with an economic dimension related to the work effort. The effort in the work that a person does, can be diminished if there is no guarantee that it will result in a fair retribution. This can be accentuated if the perception of injustice is accompanied by a belief in favoritism that can unfairly benefit some over others. In other words, the perception of injustice in the distribution of income in a society can be a disincentive to investment and individual effort. This is a line of research for scholars of microeconomics and their social dynamics.

12 See Dubet, 2012 (Dubet, 2012). For a broader discussion of this topic in Latin America see, among others, number 239 of the Nueva Sociedad magazine.

13 Socrates constructs the concept in a dialogue in which it is opposed to concepts such as the will of the strongest, and which places the social as a central element in his conception of justice.

The second implication of justice in the distribution of income is approached as one of the hypotheses of this work, and proposes to understand the perception of justice as part of a set of elements related to the quality of life of people, which goes beyond of purely economic indicators. A good living, or living well, requires citizens to understand that they live in a fair society, in which the retribution received by each person is proportional to the effort of each individual, and this should be manifested in a relationship between subjective quality indicators of life and the perception of justice in the distribution of income in a country.

The subjectivist view of quality of life is broad and considers different methodological approaches to measure indicators that, like happiness or satisfaction with life, reflect the way in which people feel in relation to others and what they expect from others, and about what they expect from themselves in their social environment[14]. In this section we focus on the evaluation that the individual is asked to make about his / her level of satisfaction with his / her life, government in general terms.

The analysis of the 2015 data from Latinobarómetro for Latin America allows us to better understand the relationship that exists between satisfaction with life and the perception of justice in the distribution of income in the country. For that, a linear regression analysis is proposed that the independent variable is the satisfaction with life that people declare and that includes as independent variables a series of factors that may be related to feeling satisfied, including the perception of justice in the distribution of income in the country. The following table presents the results of this analysis, while the annex includes the detail of the questions used.

Table 1
Results of linear regression for life satisfaction

Variable	Coef.	Std. Err.	t
Interpersonal trust	0.024137	0.0148508	1.63
Sufficiency family economy	0.0804096	0.0075481	10.65*
Justice in the distribution of income	0.0631709	0.0079221	7.97*
Personal economic situation	0.2435194	0.0080157	30.38*
Education level	0.0241036	0.0037498	6.43*
Age	-0.0094804	0.0060056	-1.58
Woman	0.0137455	0.0110955	1.24
Subjective social class	0.0468571	0.0065954	7.1*
Size of the city	-0.0024975	0.0027731	-0.9

* P<.001; N=17889; Adj RSq=.1552; Fixed effects by country omitted
Source: Latinobarómetro, 2015

Of the variables included in the model there are five that have a statistically significant effect independent of the other factors: having income that is sufficient for the needs of

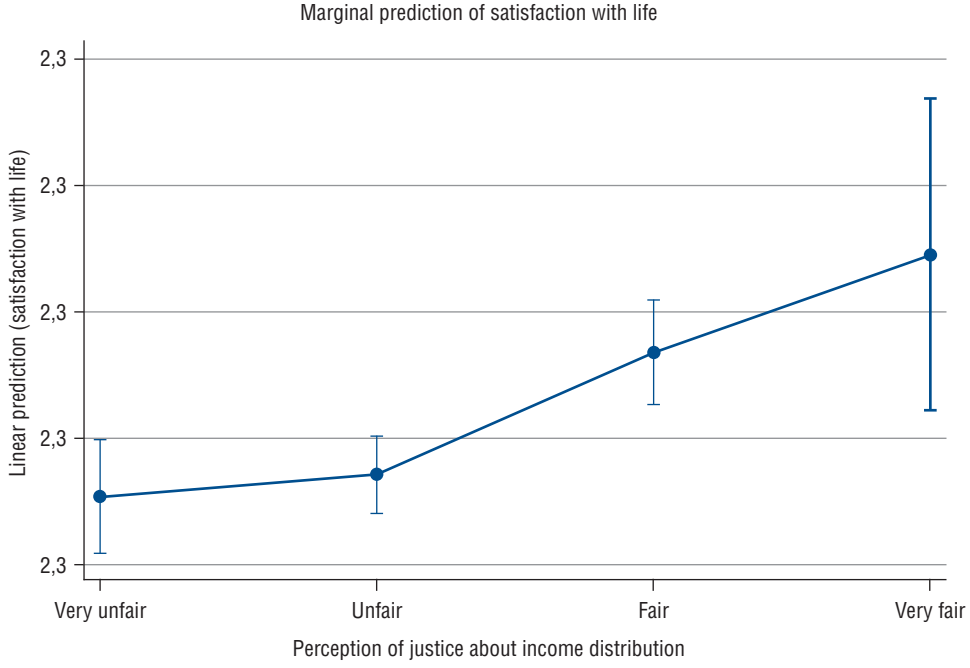
14 Veenhoven's research is among the pioneers on satisfaction with life (Veenhoven, 1991, 1993). See also (Easterlin, 1995; Radcliff, 2001)

the household, having a favorable perception of their economic situation, the level of education and feeling of a high social class. The fifth is the variable that we propose here to measure the perception of citizens about redistributive justice.

People who feel they live in a country in which income distribution is fair are on average more satisfied with their lives than those who believe that the distribution of income in the country is less fair. This relationship is independent of factors such as the sex of the person, their age, their educational level, the perception of their economy and social class, the size of the locality in which they live and the country in which they live (the data used in the analysis is for the entire region).

The following graph shows the marginal effect of the perception of justice in the distribution of income over satisfaction with life, this time in the Andean region, once it is controlled by the effect of the other variables mentioned in the model.[15]

Graph 6
Marginal effect of the perception of justice in income distribution about satisfaction with life, Andean area



Source: Own elaboration with data from Latinobarómetro, 2015.

15 The marginal effect of the regression is the prediction of the behavior of the dependent variable according to the variation in the independent variable, keeping constant the values of the other variables included in the regression model.

The results show that there is a solid correlation between both variables, which is independent of other variables. Regardless of the value of other factors (including the same differences in national averages), people who believe that the distribution of income in their country is fairer tend to be more satisfied with their lives than those who perceive injustice in the way they the income is distributed. In other words, satisfaction with one's life depends in part on the fact that the citizen believes that he lives in a context in which the distribution of wealth is moderately fair.

4. The role of the government and inequality

The final element considered in this paper is the political attitude of people towards inequality. We are interested in knowing if people believe that inequality is a subject that can be actionable and if it merits government intervention to resolve it. What it is, then, is to address the understanding of inequality as a political issue from the perceptions of citizens.

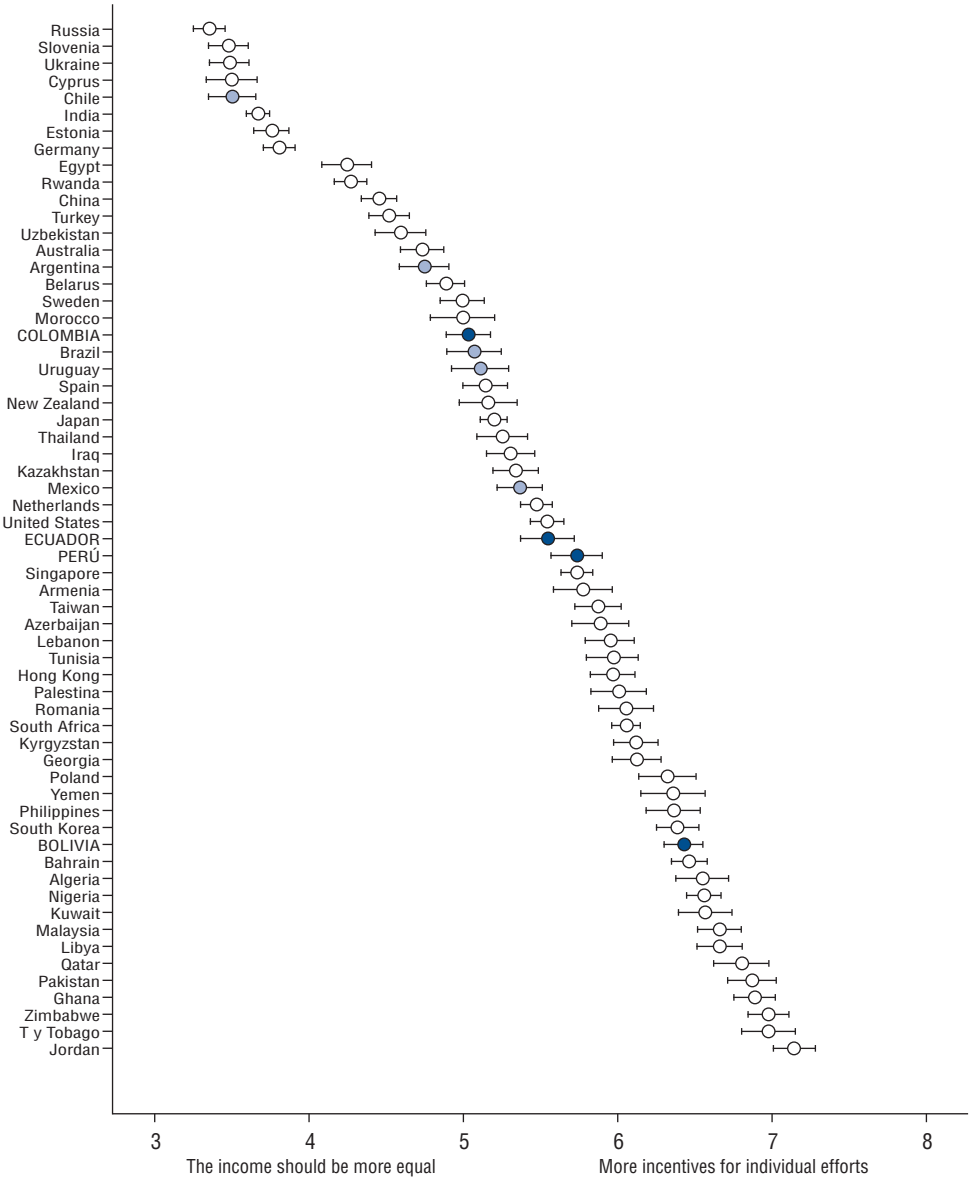
The question we try to answer has to do directly with the role of the government in the face of inequality, thinking about the possibility that citizens understand that inequality should be the object of public policies aimed at reducing it (or at least aimed at reducing the injustice related to it). This implies that people understand that inequality - and justice or injustice derived from it - is a public issue and that the Government must take responsibility on the issue. Inequality becomes a political concept.

Fortunately, in order to operationalize the public (and therefore political) character of inequality, there are different sources of information. One of them is the database of the World Values Survey; the EMV asks in the last round carried out so far (6, which ends in 2014) if people believe that the income should be more equal or if there should be more incentive for individual effort. The advantage of this source of information is that it allows us to look at the countries of Latin America and compare them not only among them, but also with the rest of the world.

The following graph shows the national averages of answer to this question for different countries in the world, using the data of the World Values Survey[16]. The exact wording of the question used in the survey can be found in the annex to the document.

16 The data for all countries come from the database of the World Values Survey for round 6, with the exception of Bolivia, a country for which preliminary data from round 7 provided by Citizenship are used.

Graph 7
National averages of perception on income and equality, 2014



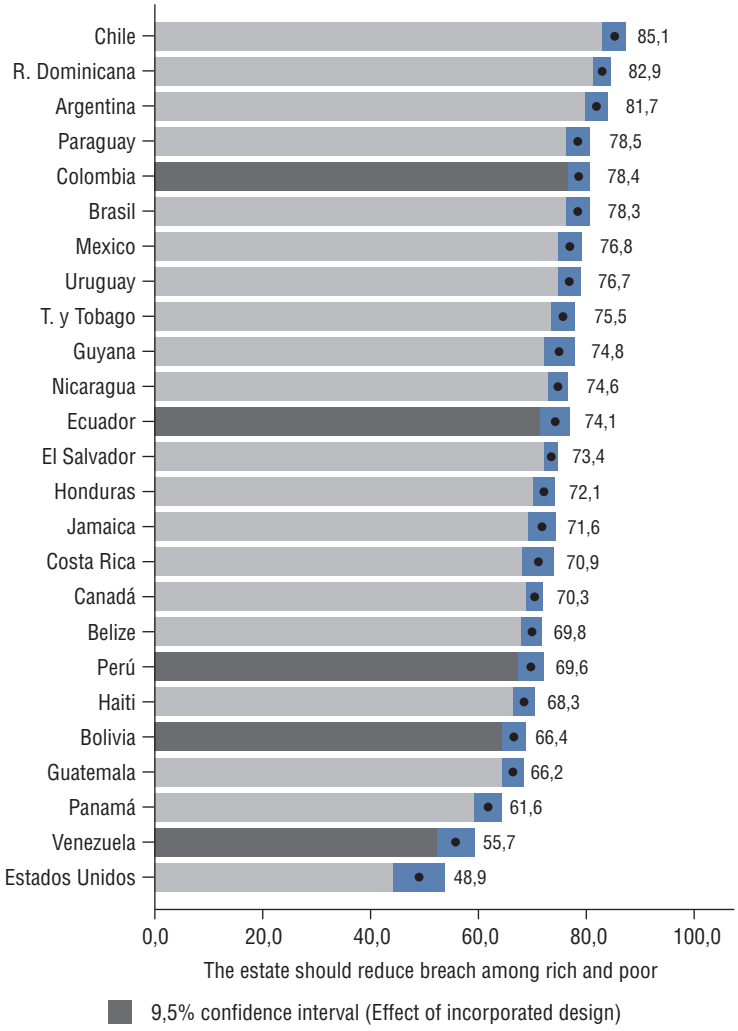
Source: World Values Survey, round 6 and preliminary data for round 7 for Bolivia.

It is clear that there is a great dispersion in Latin American countries in the preference of more equal income or more incentives for individual effort. The extremes are Chile, on one hand, which is the country that shows the highest citizen preference in the region (and the world) for greater equality, and Bolivia, on the other, which is the Latin American country

with the greatest preference for individual effort. But beyond showing the aforementioned dispersion and that neither Latin America nor the Andean region are distinguished strongly from the world in this preference, the previous data does not tell us much.

Let's see then what happens when we ask about the role of the government regarding inequality. For that we resorted to the LAPOP Americas Barometer database, which in its most recent public round, the 2014 one, inquires about whether the Government should assume policies to combat inequality. The following graph shows the results of the question for the countries of the Americas.

Graph 8
Average perception of the Government's role in reducing inequality, 2014



Source: LAPOP 2014.

Equality as a positive action from the government to reduce gaps between rich and poor, has a majority support in the population of all countries in the region, although, again, there are important differences between them. Chile again appears as the country with the greatest demand for equalizing policies, while the averages in the countries with the greatest advances in redistributive policies, such as Venezuela or Bolivia, are much lower.

It is relevant that when Latin American countries are considered, there is no statistically significant relationship between the demand for an equalizing government and the objective inequality measured by the Gini index. Nor is there a relationship between demand for equalizing government and the difference in inequality reported at the beginning of this work between 2002 and 2015. This finding has a special importance for the discussion about inequality and politics since there is no greater demand for an action. The positive attitude of the government in reducing inequality in more unequal contexts means that inequality, by itself, is not enough to generate a public opinion that specifically demands the implementation of redistributive policies[17].

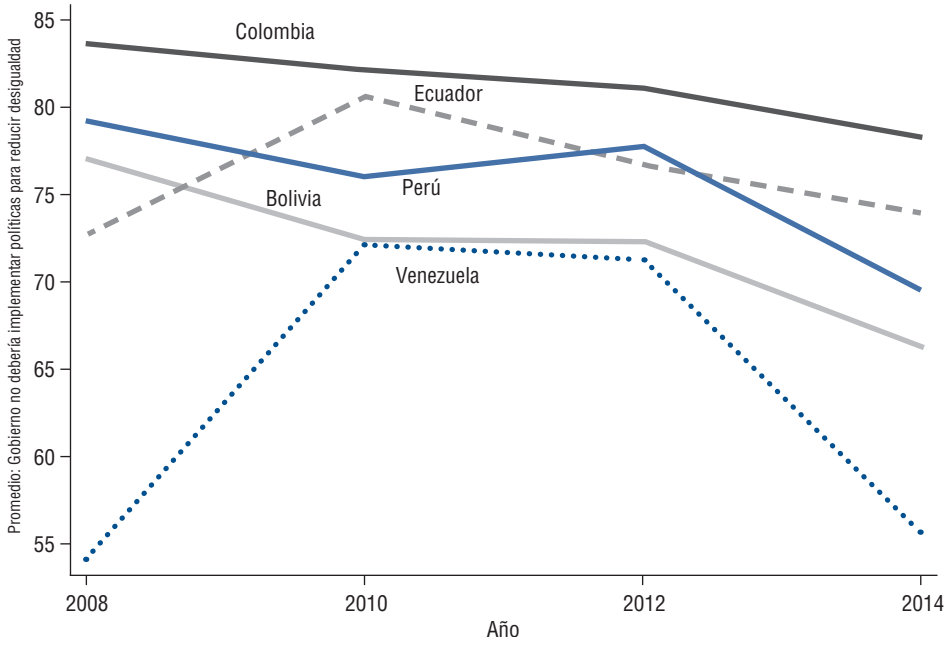
The data also shows us that the average attitude of people has varied significantly during the last years. In the Andean region, the degree of agreement with the affirmation that the government should implement firm policies to reduce inequality between rich and poor has been decreasing consistently during the last 6 years. Interestingly, the same trend is recorded for both the highest and the lowest socioeconomic levels. The following graph shows the evolution of this valuation in the period already mentioned for the 5 countries of the Andean region.

Perhaps as a reflection of the objective reduction of inequality, the inhabitants of the Andean countries are no longer so convinced that government intervention through the application of "forceful" policies to reduce inequality is necessary. The trend in 4 of the 5 countries is of descent, with the sole exception of Venezuela, a country in which perceptions on this issue seem to be strongly affected by aspects of the country's political and social situation.

Let's see now which ones are the factors that explain the variations in the perception that the government should play an important role in reducing inequality in the Andean region. The following table presents the results of a linear regression analysis of the variable that reflects this perception and that includes a set of factors among which is also the country of residence.

17 To affirm this conclusively it would be necessary to have more empirical support to rule out the existence of the relationship. For example, it would be necessary to consider a greater number of cases to verify the relationship. This can be done using international comparisons of the World Values Survey or from other sources, although this exact item is not available. Another possibility is to analyze the data at the subnational level, assuming that there is information on this level about inequality in each country and adding survey data as permitted by their sample designs. The absence of this relationship, although complicated by the possible ecological inference, may be showing that there is something more than a direct relationship around the relationship between inequality and the demand for a redistributive government

Graph 9
Average perception of the Government's role in reducing inequality, by socio-economic level



Source: LAPOP 2014.

Table 2
Linear regression results for the preference for a leveling government

Variable	Coefficient	Std. Err.	T
Approval of the President's work	0.2279455	0.0191936	11.88*
Spanish as first language	6.238791	1.67462	3.73*
Rural area	6.181078	1.278405	4.83*
Wealth	-1.274747	0.3723025	-3.42*
Gender (women)	-0.7112321	0.7237853	-0.98
The family economy cover their needs	0.000463	0.0099632	0.05
Age group	0.5103229	0.2342754	2.18**
Education level	0.7015599	0.6319522	1.11
Ideology (right wing)	-1.00206	0.1801025	-5.56*
Ecuador	-12.32724	1.815097	-6.79*
Bolivia	-15.55726	1.589888	-9.79*
Peru	-7.814457	1.711706	-4.57*
Venezuela	-19.04841	1.974245	-9.65*

* P<.001; ** P<.05; N=8457; Adj RSq=.111; strong standard errors.
Source: LAPOP, 2014.

As can be seen, in the Andean region there are different factors that determine the preference of citizens for a government that implements policies that reduce inequality. As might be expected, individuals with greater wealth, measured by capital goods in the home, tend to favor less equalizing or redistributive policies. Young people are also less favorable to these policies than the older ones, as are the inhabitants of urban areas (the demand for redistributive policies is higher in rural areas).

The two political variables, which are the ones that interest in this section, have a statistically significant independent effect on the preference for an equalizing government. As might be expected, ideological self-positioning is linked to the approval of equalizing policies; the more to the right of the scale of ideological self-positioning a person is located, the lower is their average approval of a Government that is involved in the issue of inequality. And the approval of the president's work also has a strong effect: the higher the support for the president, the greater the approval of redistributive policies.

However, when the same statistical analysis is carried out in each of the countries, it is observed that this variable only has a statistically significant effect in the three countries that at the time of the survey, first quarter of 2014, had democratically elected populist governments. In Peru and Colombia, on the other hand, approval of the president's work has no effect on the consideration of a redistributive government.

5. Democracy and equality

The last element that we consider here is the relationship which exists for Latin Americans between democracy and an active role of the government in the reduction of inequality. As a successful result of democratic consolidation in Latin American[18] countries, democracy has become a common denominator of what citizens expect as a form of government in Latin America. Contemporary politics in Latin America cannot be thought outside the democratic framework (or at least outside the democratic discourse) because citizens understand this, and political actors know that these are the minimum rules of the game to participate in the struggle for democracy power (UNDP, 2004, Calderon, 2013).

But beyond the minimalist definition of democracy as a form of election of representatives, the very concept of democracy is in dispute and in a process of permanent construction. We all accept the importance of democracy and understand that it is essential for the exercise of politics, but beyond some common denominators, the very definition of democracy, of its meaning, is part of the contemporary political dispute (Mayorga, 2014).

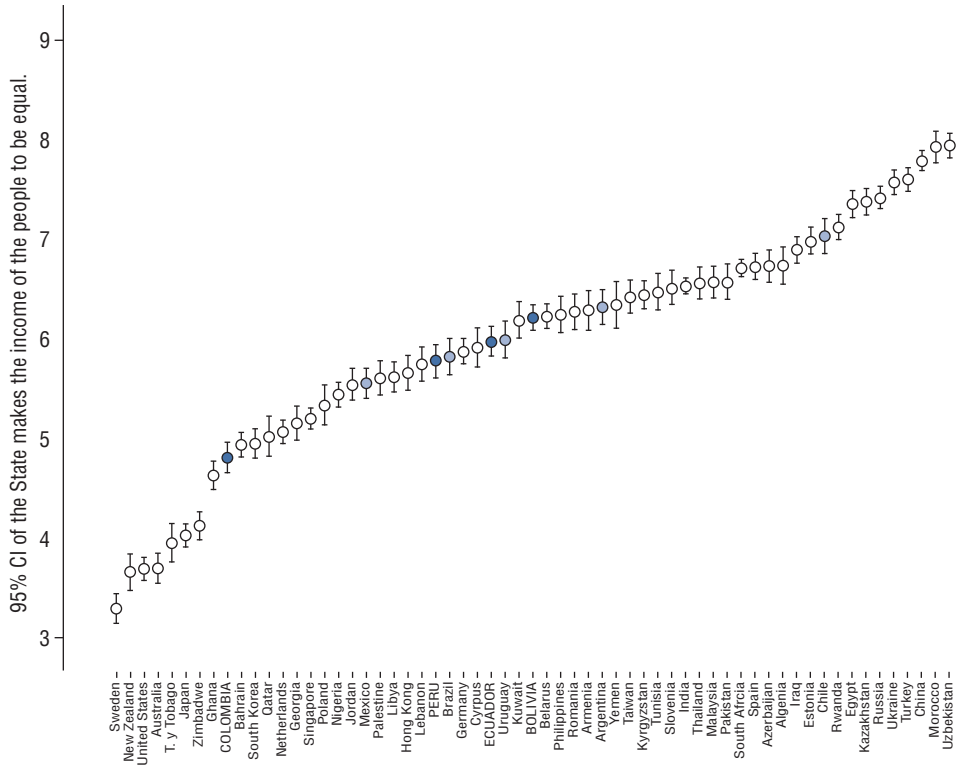
Thus, the definition of the meaning of democracy is disputed in different political discursive axes. One of them is shaped by the tension between institutional views (rule

18 This is a phenomenon that occurs throughout the world, not only in Latin America. The so-called third wave of democratization has resulted in a number of countries in the world that elect their rulers through relatively free elections that is the highest in history. There has not been another moment in history when more people in the world live under a democratic regime.

of law) and the majority view (respect for the will of the majority). We can find a second axis in the tensions between libertarian and individualist understandings versus more communitarian and egalitarian understandings.

It is precisely at one of the poles of this axis of tension of the senses of democracy that the idea of equality appears. How far a society is from equals an essential feature of democracy? To what extent should the Government intervene to achieve equality as a condition of democracy? This is precisely the question that the World Values Survey asks in its last round. The results of a comparison of the international averages for this variable are presented in the following graph.

Graph 10
Averages of perception of the equalizing State as an essential characteristic of democracy, 2011-14



Source: World Values Survey, round 6 and preliminary data for round 7 for Bolivia.

The countries of Latin America show a significant dispersion in the averages of this variable, although with the exception of Colombia, all are in the upper half of the scale, although very close to the limit of neutrality in the response (which means that the idea that the government makes income more equal is an essential feature of democracy has

slightly more approval than disapproval in the region). Chile again appears as the extreme in the comparison, with a strong demand for public policies oriented towards equality, while the averages for Ecuador, Peru and Bolivia show average values in the international comparison. But the relevant fact is that it does not seem obvious that Latin Americans, or even the inhabitants of the Andean region, understand that democracy requires an equalizing Government. It seems that if equality is important in the region it is because of its own normative value or because of its implications for the quality of life of the people, and not because of its link with democracy.

6. Conclusions

This essay presents useful evidence for the debate on inequalities in Latin America and its Andean region, focusing on the perceptions of citizens on this issue and on the role of the government in relation to it. The exercise highlights the importance of considering social factors, specifically what people think, when considering an economic issue that in this case is inequality, but that could be extended to others such as economic growth or poverty reduction.

The information discussed in the paper allows us to propose 4 conclusions about the perceptions that Latin Americans have about inequality:

1. *The perception of injustice in the distribution of income has been decreasing*. Citizens believe that the distribution of income in the country is less unfair now than it was a little over a decade ago; this is a trend that is registered in most Latin American countries, although not in all. This change in perception has occurred in parallel with the change in the objective indicators of inequality in the countries. Moreover, the evidence suggests that perceptions of inequality may have changed more rapidly than inequality itself, which reinforces the importance of the symbolic and socially constructed character of inequality, and emphasizes the political component of perceptions of inequality and justice.
2. *The demand for a redistributive government is reduced*. The successes achieved in terms of reducing inequality both at the objective level and in the perceptions of citizens, show that on average Latin American societies demand less a government that intervenes actively in the reduction of inequalities than it did a few years ago, when it was a stronger opinion. Society in general is less convinced of the need to have a government that actively reduces inequality, although there are important differences in this preference related to the political position of the person. A necessary mention should be made around Chile, which, without being the most unequal society or the one where inequality has been reduced the least, shows a demand for policies that promote equality much stronger than any other country in the region. It is also relevant that the demand for a government that intervenes to promote equality does not seem to be directly linked to Latin American understandings of democracy, but rather to normative factors that emphasize justice or practical factors such as quality of life.

3. *Satisfaction with life depends on the perception of justice in the distribution of income*. This finding shows that the quality of life, evaluated by the citizens themselves in relation to the satisfaction they have with their lives, tends to be higher in societies with less perceived injustice in the distribution of income. Societies that are perceived as fair in terms of the distribution of income have citizens more satisfied with their lives than those perceived as less fair, and the relationship is maintained when we move to the level of individual analysis. This is an important element for the debate on inequality and justice in the Andean region and in Latin America, as it suggests that greater justice in the distribution of income not only has a normative value in itself, but also has repercussions on other dimensions of the quality of life in a country.
4. *There is a political dimension of perception about inequality*. There are non-economic factors in the perception of justice in the distribution of income, as well as in the perception of the policies that the government should adopt to promote equality. These factors are, at least in part, political and in countries with strong populist leaderships, they have to do directly with the position of citizens against the government. In the 3 Andean countries that share this type of government, the perception of justice in the distribution of income and the preference for a leveling government are closely linked to the closeness of citizens to the government.

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Annex: Variables used in the analyzes

Latino barometer questions

Latinobarómetro is a public opinion study that annually applies around 20,000 interviews in 18 Latin American countries representing more than 600 million inhabitants. It was done through a modified probabilistic sample. Probabilistic in three stages, by quotas in the final stage.

Typical sample used in national studies
Universe: Both sex, 18 and over
Coverage: 100%
Type of interview: Personal interview

Sample size: 1200
Sample error: 2.8%
www.latinobarometro.org

Perception of injustice in the distribution of income. Latinobarómetro 2002 - 2015

Question: How fair do you think the distribution of income in (country) is?

Very just, fair, unfair, very unfair.

(For purposes of statistical processing and presentation of results, the options were recoded with a value of -100 for the "very fair" response, -33 for "just", 33 for "unfair" and 100 for "very unfair"). This decision makes it possible to maintain a scale with equidistant points, such as the original scale, at the same time that the positive (fair) or negative (unfair) character of the assessment made by the interviewees is represented numerically. The information for the missing data annual points in both variables of figure 1 has been interpolated on the basis of the information available.

Perception of whether the country is governed for the good of the entire people. Latinobarómetro, 2015

Question: In general terms, would you say that (country) is governed by a few powerful groups for its own benefit, or that it is governed for the good of the entire people?

The responses were recoded giving a value of 100 for the answer "For the good of the whole people" and of -100 for the answer "Powerful groups for their own benefit", which explains the negative averages.

Satisfaction with life. Latinobarómetro, 2015

Question: Generally speaking, would you say you are satisfied with your life? Would you say that he is ...? Very satisfied, quite satisfied, not very satisfied, not at all satisfied.

The responses were recorded on a 4-point scale ranging from 0 (not at all satisfied) to 100 (very satisfied).

Questions from LAPOP (Public Opinion Project of Latin America)

The study is conducted in 28 countries and has a total of 53,566 interviews in 2014. The samples in each country were developed using a multi-stage probabilistic design by conglomerates (with quotas at the household level), and were stratified by regions, size of the municipalities and by urban and rural area within each municipality.

Typical sample in national studies:
Universe: Both sex, 18 and over
Coverage: 100%
Type of interview: Personal interview
Sample size: 1,200
Sample error: + - 2%
www.vanderbilt.edu/lapop/

Satisfaction with life. LAPOP 1998-2014

Question: Generally speaking, would you say you are satisfied with your life? Would you say that he is ...? Very satisfied, satisfied, dissatisfied, very dissatisfied.

The variable was recoded to have a scale that easily denotes the positive or negative character of the evaluation, resulting in a scale of -100 to 100 in which "very dissatisfied" was recoded as -100, "unsatisfied" as -33, "satisfied" as 33 and "very satisfied" as 100.

Perception of the role of the government in the reduction of inequality. LAPOP 2014

Question: The Bolivian Government must implement firm policies to reduce income inequality between rich and poor. To what extent do you agree or disagree with this phrase?

The answers, on an original scale from 1 to 7, are recoded on a scale ranging from 0 to 100 for clarity in the presentation.

Questions from the World Values Survey

The study conducts national surveys in which a common questionnaire is applied, 6 rounds have been developed since 1981 in almost 100 countries covering 90% of the world population, giving a total of 400,000 interviews. The sample used is a probabilistic multistage sample that represents the adult population of the country over 18 years of age. The data included in the report correspond to round 6 with the exception of the data for Bolivia, which are preliminary data of the EMV in round 7, first raised in Bolivia by Ciudadanía during the first half of 2017.

National typical sample
Universe: Both sex, 18 and over
Type of interview: Personal interview
Sample size: 1,200
Sample error: + -2.16%
http://www.worldvaluessurvey.org

The role of the Government and inequality

Question: *Now I would like you to tell me what you think about various issues. Where would you place your opinion on this scale? 1 means that you are in full agreement with the statement on the left, 10 means that you fully agree with the statement on the right; and if your opinion is somewhere else in the middle of the scale, you can choose the corresponding number.*

Revenues should be more equal / There should be greater incentives for individual effort.

Equalizing government as an essential quality of democracy

Question: *Many things are desirable, but not all are essential features of democracy. Please tell me for each of the following, to what extent is essential as a feature of democracy. Use this scale,*

where 1 means that it is not at all an essential feature of democracy and 10 means that it definitely is an essential feature of democracy.

The Government makes the income of people equal.

Results of linear regression for perception of justice in income distribution

	Coef.	Std. Err.	t
It is governed for the people	0.0031637	0.0002262	13.99
Approval of the management	0.0038704	0.0002209	17.52
Family income is enough	0.0809463	0.0128758	6.29
Evaluation of the personal economic situation	0.1757328	0.0141192	12.45
Education	-0.0210605	0.006778	-3.11
Age	-0.015828	0.010545	-1.5
Gender (woman)	-0.0046122	0.0189469	-0.24
Self-perceived class	0.0108943	0.0114128	0.95
Size of the city	-0.0074781	0.0045833	-1.63
IDENPA			
Colombia	-0.3807466	0.0320524	-11.88
Ecuador	0.1722885	0.0324072	5.32
Peru	-0.0732378	0.0333268	-2.2
Venezuela	-0.0807525	0.0329715	-2.45

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