Freie Universität Berlin

Natural Resources, Demand for External Finance and Financial Development

Christian Hattendorff

School of Business & Economics
Discussion Paper

Economics

2014/33

Natural Resources, Demand for External Finance and Financial Development

Christian Hattendorff[1]

November 2014

Abstract: The paper contributes to the ongoing debate on the natural resource curse, which postulates a negative link between natural resource abundance and economic growth. It shows empirically that resource-rich countries appear to have a less developed financial system and investigates a potential mechanism behind this connection by applying insights from the finance and trade literature. It tests whether the resource sectors' lower demand for short-term external credit negatively affects financial development. This is done with cross-sectional and panel analysis, using an instrument for credit demand based on exogenous geographic determinants. The results, however, suggest that poor economic diversity rather than firms' credit demand drives the detrimental effect of resources on finance.

JEL classifications: F10, G10, O13, O16

Keywords: Financial development, external dependence, natural resource curse, international trade, gravity model

[1]Institute for East European Studies and School of Business & Economics, Freie Universität Berlin, Garystr. 55, 14195 Berlin, christian.hattendorff@fu-berlin.de. The present working paper essentially corresponds to the second chapter of my dissertation "The Resource Curse Revisited: Three Essays on Resource Abundance and Financial Development." I am grateful for comments and suggestions to participants of the "Göttingen International Economics Workshop 2013" and of the Annual Meeting 2013 of the German Economic Association (VfS) at the University of Düsseldorf.

1 Introduction

The observation that resource-based economies experienced rather low growth rates in the last 60 years compared to other nations suggests that resources might be a curse rather than a blessing. Various explanations for this phenomenon have been proposed: for example, harmful exchange rate effects, exposure to conflicts or a weak institutional framework. This paper investigates whether financial systems are less developed in resource-abundant economies due to lower external credit demand, assuming an indirect effect on growth.

The following discussion builds on the literature's finding that finance is an important determinant of growth. In order to evaluate the effect of natural resources on welfare, it is crucial to explore a potential financial channel. I find a significant negative link between resource abundance, in particular resource dominance, and financial development, which confirms previous empirical studies.

The present paper further contributes to the literature by investigating in detail a potential explanation for this negative relationship. Its approach emphasizes the demand-side effect in the determination of financial markets. It follows the finding that industrial sectors systematically differ in their dependence on the financial sector. Financially independent firms need less external finance because they can use internal cash flow for investment instead. In an economy with many financially independent firms, credit demand may be low, resulting in less need to develop a large financial sector providing external credit. This consideration is based on the belief that financial development is at least partly influenced by the demand for external credit. If resource sectors were financially independent—as has been suggested by many researchers—resource-dominated countries would have a less developed financial system as a consequence. Previous work shows that resource sectors rely less on external finance when the measure of financial dependence refers to short-term liquidity needs.

In order to formally address the problem, the paper applies a model developed in the

trade and finance literature by Do and Levchenko (2007) that studies the relationship between financial development and sectoral external dependence in the presence of international trade.

I follow essentially the same empirical strategy, while adjusting it to the purposes of the natural resources analysis. An economy's aggregate (short-term) credit demand is proxied by the external finance need of exports (abbr. $EFNX$), where the financial dependence of a sector is multiplied by its share in the country's total exports. This measure thus captures the credit demand that arises from the country's export structure. It is used as the main right-hand side variable in the regression equation, while the dependent variable is a measure of financial development. Estimation is done with ordinary least squares (OLS) in a cross-section of 93 (110) countries with averages from 1970 to 2007 (1992 to 2007). Control variables include other determinants of financial development such as income per capita, trade openness and legal origin. In addition, I estimate a panel specification with both time and country fixed effects in order to capture omitted variables.

As the literature suggests, financial development (as an endowment) might, in turn, influence the export structure, which is embodied in the proxy $EFNX$. In order to handle this important endogeneity problem, I construct an instrument for the country's aggregate credit demand. The actual trade flows are predicted with the help of sector-level gravity estimations with exogenous geographic determinants of trade such as distance and land area. Estimations for each sector make it possible to predict the export pattern rather than just the trade volume. The obtained instrument is used in a two-stage least squares (2SLS) regression.

At first glance, the results appear ambiguous. In the cross-section with both OLS and 2SLS, there is evidence of a resource curse operating via the proposed demand-side effect in the financial system. In contrast, the panel analysis does not support this hypothesis, which could be due to omitted variables in the cross-section. Following the literature on resources, the quality of a country's institutions may play a role in this context. Robustness checks, however, show that measures of institutional quality are unlikely to be an omitted variable. Further analysis suggests that most resource-based

countries show high export concentration. A poorly diversified economy rather than low credit demand of resource firms may explain the negative link between resources and finance.

The paper is structured as follows: Section 2 gives an overview of the resource curse literature. Section 3 sheds light on a possible financial channel and explains the application of the theory in detail. The empirical strategy and data are described in Section 4. The results are presented in Section 5. Section 6 concludes.

2 The Natural Resource Curse

In the last several decades, economists have observed that on average resource-rich countries, especially many African, Latin American and Arab nations such as Nigeria, Sierra Leone, Venezuela and Saudi Arabia, tend to grow at slower rates than countries with few natural resources. While resource abundance was considered unambiguously positive until World War II, economic literature later started to analyze this "paradox of plenty" (Karl 1997) more closely. The phenomenon is usually referred to as the "resource curse" (Auty 1994), where the resources of interest are point resources with a high concentration in certain regions of the world such as oil, natural gas and mining products.

A number of empirical studies have tried to validate the resource curse hypothesis, including the work of Sachs and Warner (1995, 2001), who apply resource exports relative to gross domestic product (GDP) as a measure of a country's resource abundance. These studies, however, have been challenged by recent publications. The measure of abundance is criticized in particular because output- and trade-related variables suffer from endogeneity problems. These variables might just represent low economic diversification, which is a common characteristic of poor countries, and not the actual resource abundance. Brunnschweiler (2008), for example, proposes alternative measures such as subsoil wealth per capita, which are more appropriate to capturing the actual natural resource endowment of an economy. Alexeev and Conrad (2009) point out that most empirical papers do not consider economic booms in the early years of

extraction prior to the 1970s, thereby underestimating the role of resource depletion over time. These authors are more skeptical towards the presence of a resource curse. Nevertheless, there is still an ongoing and lively debate on the detrimental effect of resource abundance on a country's development that is far from reaching consensus.

In order to explain the mechanisms through which the resource curse may operate, economists have presented a variety of theories. One explanation that has been popular among researchers is the so-called "Dutch disease," based on the supposed experience of the Netherlands after a resource boom in the 1960s. It states that the rents obtained from resource exports can render a country's manufacturing sector less competitive by raising the real exchange rate (see Corden and Neary 1982, van Wijnbergen 1984, Stijns 2003). Another theory suggests that resource abundance might foster armed conflicts and civil war through the "looting" of resources by rebel groups and "grievances" in local communities due to mineral extraction (e.g., Ross 2004). Gylfason (2001) finds that natural capital deteriorates public and private incentives to accumulate human capital. Recent work emphasizes that a national economy dominated by resource extraction is heavily exposed to welfare-decreasing macroeconomic volatility (van der Ploeg 2010).

Yet another explanation that has gained prominence in recent years is that the resource curse operates through the institutional channel (Mehlum, Moene and Torvik 2006). On the one hand, differences in the quality of institutions, including the legal and political system, the rule of law as well as property rights, determine whether resources are advantageous or disadvantageous for an economy. On the other hand, resource extraction may, in turn, affect a country's institutions. Researchers show that both private agents and politicians tend to engage in rent-seeking in order to benefit from the available resource income, thereby crowding out profit-oriented entrepreneurship and fostering corruption among bureaucrats (see, e.g., Tornell and Lane 1999, Sala-i-Martin and Subramanian 2003). Resource dominance has been associated with a lack of democracy and a tendency towards autocratic political systems (see, e.g., Ross 2001). The institutional hypothesis is important because institutions are considered to play a crucial role for the development of an economy (Acemoglu, Johnson and Robinson 2001). Furthermore, the theory can explain why some resource-rich countries such as

Australia, Canada, Norway and Botswana have been very successful economically in recent decades. These countries were able to avoid or overcome the resource curse due to their strong institutional environment, and they show that resource abundance does not necessarily lead to lower economic growth.[2]

Given the importance of the institutional setting, it is surprising that there has been relatively little research on finance as a possible channel of the resource curse. Indeed, growth economists have identified financial development as a major determinant of growth (see, e.g., Levine 2005, Rajan and Zingales 1998).[3] Thus, resource abundance could indirectly affect economic growth through a country's financial system.

3 The Financial Channel

Do resource-rich economies show less developed financial systems? Figure 1 suggests that this indeed seems to be the case.[4] Countries with a high share of resources in total exports tend to have a smaller financial sector measured by private credit to GDP. Section 5.1 shows in more detail that this holds true when controlling for other determinants of financial development such as real GDP per capita and trade openness. This is in line with recent papers' findings (Nili and Rastad 2007, Beck 2011, Kurronen 2012).

3.1 Literature

There are several explanations for this negative relationship. Nili and Rastad (2007) identify a dominant role of the government in investment and a weak private sector as the main drivers of relatively low financial development. Berglöf and Lehmann (2009,

[2]For an overview of the resource curse literature, see, e.g., the World Trade Report (2010).

[3]In the wake of the financial crisis of 2008 and 2009, more recent studies claim that exceedingly large financial sectors may be bad for growth (Arcand, Berkes and Panizza 2011). However, in a broad cross-section of countries, many with developing and emerging economies, higher financial development may generally be considered advantageous, in particular in the long run.

[4]Here, the export share of resources is depicted as $log[\text{share}/(1-\text{share})]$. "Log" refers to the natural logarithm in this paper. Data averages from 1970 to 2007.

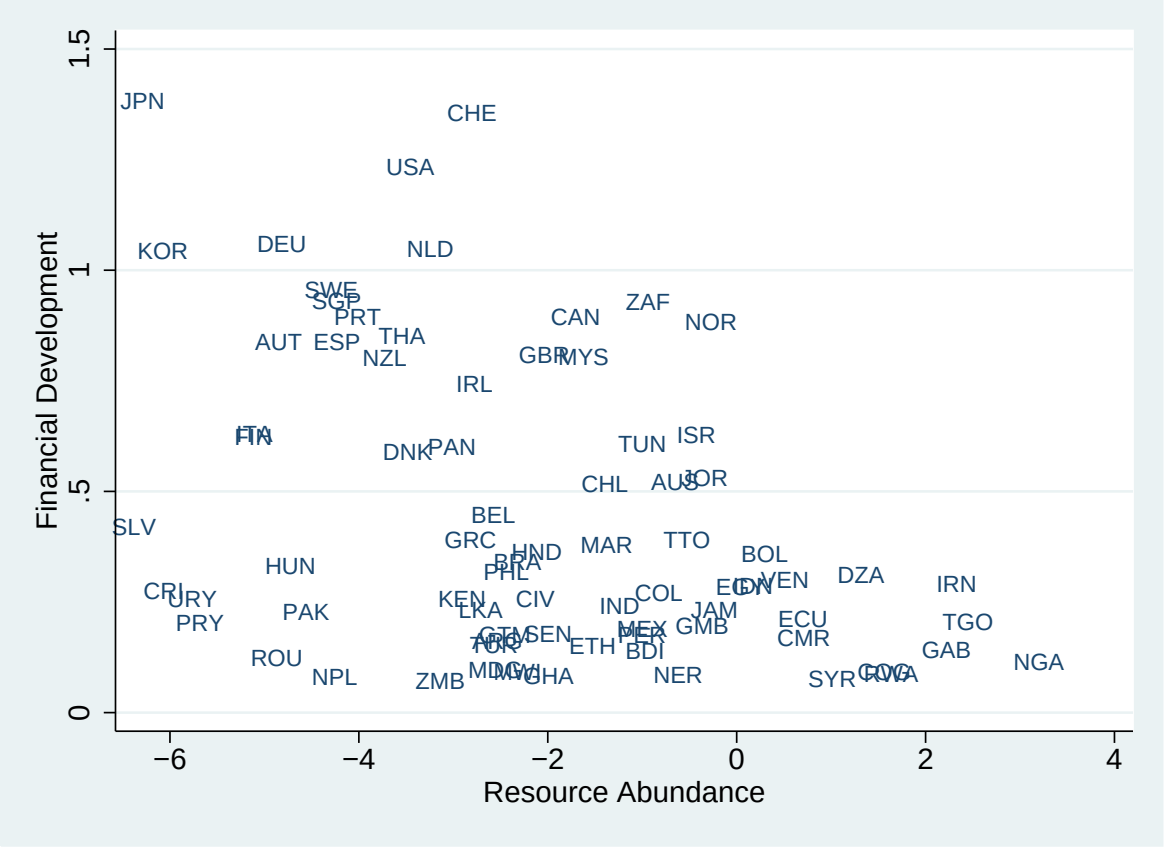

Figure 1: Financial Development (private credit to GDP) and Resource Abundance (export share of resources).

p.199) argue that "bulkiness of investment and a lack of demand for broader financial services" might play a role, but remain silent on the details or empirical underpinning.

Yuxiang and Chen (2011) name four possible mechanisms: first, a resource boom often weakens the tradable sector of an economy. Accordingly, there is less support for liberal trade policies, which are generally positively correlated with financial development. Second, rent-seeking and corruption in resource-based economies undermine a government's credibility and thus its ability to promote reliable financial sector reforms. Opportunities for rent-seeking may also reduce the activity and credit demand of entrepreneurs. Third, the detrimental effect of resource abundance on human capital (see Section 2) may weaken the social capital of an economy, that is, its level of trust. Since trust plays an important role for financial contracts, financial development may shrink as well (Guiso, Sapienza and Zingales 2004b). Fourth, the finding of Gylfason and Zoega (2006) that resource abundance negatively affects productive investment

may also have implications for the financial sector.

Another argument is that the macroeconomic volatility caused by cyclical and highly uncertain commodity prices generally weakens financial development, as has been suggested by Kurronen (2012). The author further points out that local incumbents, especially in the resource sectors, tend to prevent financial reforms in order to deter competitors from market entry, who typically rely more on external finance at the beginning (see also Rajan and Zingales 2003).

3.2 Financial Development and Demand for External Finance

This paper proposes and empirically investigates another channel by which the resource curse may operate. The approach follows the assumption that firms' financial dependence and thus demand for external finance, ceteris paribus, determines the size of the financial sector. If resource firms relied less on external finance than manufacturing companies, there would be less credit demand in the economy and, therefore, a smaller and less developed financial system.[5]

3.2.1 Theory

Rajan and Zingales (henceforth: RZ, 1998) show that industries systematically differ in their need for external financing provided by the financial sector. They assume that this is due to cross-sectoral differences in technology. The finding has become an important building block for studies conducted on both growth and trade. In particular, Do and Levchenko (2007) apply the concept in order to explain that demand in external finance may shape an economy's financial development.

They present a model with one factor, labor, and two goods (p.800). One good is financially dependent (F), the other is not (A). Entrepreneurs in the economy can choose between the production of either of these goods. The simple good A uses a linear technology with one unit of labor for one unit of A, while the production of

[5]Kurronen (2012) hints at a similar explanation, without exploring the idea further.

F is more complicated due to additional financial constraints. In each period, the investment project of an entrepreneur producing F experiences a liquidity shock that may be either positive or negative. In order to fulfill possible liquidity need, agents can borrow on a spot credit market, where capital is provided by entrepreneurs with excess liquidity (p.801). The model finds that the probability of a firm's liquidation shrinks with an increase of the number of agents engaged in the F sector, indicating positive spillovers and a "positive relation between the financial system's size and its quality" (p.802). Furthermore, this leads to less volatility in the total output of the constrained sector. The authors show that in an autarky equilibrium the credit market is linear in the size of this sector.

In a trade equilibrium, however, the outcome is different. Trade between two countries, say "North" and "South," emerges due to comparative advantage other than financial development. We may assume here that there is a Ricardian productivity difference with North having an advantage in the financially dependent sector. As a consequence, North produces only good F and South, in contrast, only the simple good A. According to the logic of the model, credit demand and lending in South decline to zero. This also affects the financial system's quality since a marginal entrepreneur can no longer insure against liquidity shocks through borrowing (p.804). By contrast, North's financial system's size and quality increase. Thus, the model is able to explain how the trade pattern may influence a country's financial development. Do and Levchenko (2007) test this hypothesis empirically and, indeed, find a significant positive association.[6] Their analysis, however, is limited to manufacturing sectors.

The close relationship between the financial sector's size and financial depth is in line with empirical finance literature (e.g., Do and Levchenko 2007, Levine and Schmukler 2006). Suitable and commonly used measures such as private credit to GDP and stock market capitalization are discussed in the following sections. In addition, one may question whether national financial markets still matter with increasing internationalization since companies may just borrow on foreign capital markets. Evidence from the finance literature suggests the opposite, however. Pagano, Randl, Röell and Zechner

[6]They apply the RZ-type measure of external dependence.

(2001) analyze firms' cross-listing decisions at international stock exchanges, and find that local financial development remains to be an important determinant of a region's economic well-being. This view is supported by Guiso, Sapienza and Zingales (2004a), who show that in the financially well-integrated Italian regions, a higher regional level of financial development enhances the economic activity of local individuals.

The present paper does not claim that financial markets are only shaped by the industry's credit demand. An economy's general level of wealth (income per capita), legal origin, financial regulation and trade openness play an important role as well (La Porta, Lopez-de-Silanes, Shleifer and Vishny 1998, Mayer and Sussman 2001, Rajan and Zingales 2003).

3.2.2 Applying the Theory to the Resource Curse

How does the theory of Do and Levchenko (2007) apply to the natural resource curse? The answer relates to the external dependence of resource firms. A resource-dominated economy with a high concentration of economic activity in few resource sectors may be similar to country South (see 3.2.1) if resource sectors were financially independent. Indeed, researchers have often supposed that resource companies such as oil and gas producers rely less on external financing than others (Guriev, Plekhanov and Sonin 2009, Beck 2011). Hattendorff (2012) takes a closer look at the resource sectors' finance need in different countries by comparing various measuring approaches. This particular study shows that the resource sectors' financial dependence relative to manufacturing differs with the measure used. Table 1 shows that the resource sectors coal mining, crude petroleum and natural gas production, metal ore mining as well as other mining (ISIC Rev. 2) are rather financially dependent when the measure captures long-term financing need. An example is the RZ-type measure, which is calculated as capital expenditures minus operative cash flow divided by capital expenditures. In contrast, resource sectors rely less on external finance when the ratio of inventories to sales, which accounts for short-term liquidity need, is used.[7] This is true for oil and gas, in

[7]Using the figures of ISIC sector 353 instead of 220 for the match with oil exports below does not alter the regression results in Section 5 substantially.

particular. A meaningful financial channel of the resource curse is therefore linked to a scenario where a country's aggregate finance need measured by inventories to sales has a significant influence on financial development. It seems reasonable to surmise that short-term (and medium-term) credit in particular is provided by local banks. In contrast, long-term finance could be assumed to come mostly from equity markets. In the following empirical analysis, I will concentrate on short-term credit demand and bank-based measures of financial development such as private credit to GDP. Stock market measures will be used for robustness checks. This approach takes into consideration that my samples include developing and emerging countries, which are less suitable for investigating more sophisticated equity-based financing relations.

A list of resource and manufacturing sectors ranked by their financial dependence is depicted in Appendix Table 8. Since external dependence of sectors is relatively stable over time and across countries, figures based on U.S. data may be used for the calculation of each country's finance need. High financial development in the United States ensures that data are reliable and comprehensive. Applying these figures to other countries' industries also avoids the problem that firms' financial dependence is endogenous to the country's specific financial development (Kroszner, Laeven and Klingebiel 2007).

4 Empirical Strategy and Data

There are two hypotheses to be tested: first, a general negative relationship between financial development and resource abundance, as supposed in Figure 1; second, in order to find an explanation for this phenomenon, a positive association between financial development and a country's aggregate short-term credit demand.

4.1 Financial Development and Resource Abundance

As mentioned in Section 3, many resource-rich countries seem to have a less developed financial sector. The paper investigates this relationship more formally by examining

Financial Dependence across Sectors

ISIC Rev. 2	Sector	RZ-type Measure 1990-2009	Inventories to Sales 1990-2009
		(1)	(2)
210	Coal mining	−0.24	0.05
220	Crude petroleum and natural gas production	0.58	0.00
230	Metal ore mining	4.79	0.16
290	Other mining	−0.30	0.14
311	Food products	−0.68	0.11
313	Beverages	0.02	0.08
314	Tobacco	−5.11	0.17
321	Textile	−1.04	0.16
322	Apparel	−1.25	0.17
324	Footwear	−2.34	0.20
331	Wood products	−1.33	0.10
332	Furniture	−2.24	0.11
341	Paper and products	−1.00	0.11
342	Printing and publishing	−2.06	0.05
351	Industrial chemicals	−0.38	0.10
352	Other chemicals	−0.92	0.13
3522	Drugs	38.16	0.08
353	Petroleum refineries	−0.45	0.06
354	Petroleum and coal products	7.75	0.17
355	Rubber products	−0.01	0.15
356	Plastic products	−0.37	0.12
369	Nonmetal products	−0.11	0.13
371	Iron and steel	−0.44	0.16
372	Nonferrous metal	−0.19	0.14
381	Metal products	−1.45	0.14
382	Machinery	−0.84	0.18
3825	Office and computing	1.11	0.13
383	Electric machinery	−0.37	0.18
3832	Communication equipment	−0.41	0.16
384	Transportation equipment	−0.16	0.17
3843	Motor vehicles	−0.21	0.12
385	Professional goods	0.54	0.19
390	Other industries	0.07	0.17
Correlation		1	-0.16^{a}

(1) The RZ-type measure is calculated as $(CAPX_t - OANCF_t)/CAPX_t$, where $CAPX$ denotes capital expenditures and $OANCF$ net cash flow from operative activities (in Compustat items). (2) The ratio of inventories to sales is calculated as $INVT/SALE$. Sector classification is ISIC Rev. 2. Data are not available for agricultural sectors. See Hattendorff (2012). [a] Insignificant value.

Table 1

a cross-section of countries with averages over time. The estimating equation is:

$$FD_c = \alpha + \beta \ RESOURCES_c + \boldsymbol{\gamma} X_c + \epsilon_c, \tag{1}$$

where FD_c is a measure of country c's financial development, $RESOURCES_c$ is a measure of resource abundance and $\boldsymbol{X}_c$ is a vector of control variables. ϵ_c denotes the error term. The controls include the country's level of income per capita, its trade openness and dummies for legal origin. More information on the data will be given in Section 4.4. Estimations are done with ordinary least squares (OLS). The expectation is to find a negative coefficient β. Robustness checks include alternative measures of financial development and of resource abundance. In particular, potentially endogenous measures such as resource exports to total exports are substituted by measures that are more exogenous to other economic variables and refer to the pure natural endowment. Furthermore, I control for the quality of institutions.

4.2 Financial Development and External Finance Need of Exports

The theoretical model presented above suggests that countries whose industries show less credit demand tend to have a less developed financial sector. This may include resource-abundant countries when we look at short-term financial dependence. To show this empirically, I follow the strategy proposed by Do and Levchenko (2007) and adjust it to the purposes of the resource curse analysis.

An economy's aggregate credit demand is proxied by its external finance need of exports. This measure is constructed according to Almeida and Wolfenzon (2005):

$$EFNX_{ct} = \sum_{i=1}^{I} \omega_{ict} \ ED_i. \tag{2}$$

Subscript c indexes countries, i industries and t time periods. ω_{ict} denotes the share of sector i's exports in total exports from country c in t, including both manufacturing and natural resources. ED_i is the measure of sector i's financial dependence. Due to

data availability and the instrumentation strategy applied, I use export data instead of output data for calculating a country's aggregate credit demand. An analysis of the aggregate external finance need in manufacturing calculated with trade data (Do and Levchenko 2007, p.826) and output data (Almeida and Wolfenzon 2005, p.149) shows that both measures are, indeed, highly positively correlated (correlation coefficient of 0.72).

I estimate the following equation with OLS in a cross-section of countries:

$$FD_c = \alpha + \beta\, EFNX_c + \boldsymbol{\gamma} X_c + \epsilon_c, \tag{3}$$

where the left-hand side variable is again the measure of financial development. Control variables are the same as in regression equation (1), that is, income per capita, trade openness and legal system. The variables are averaged over several time periods. In this regression, predictions from Section 3 are supported if the coefficient β is significantly larger than zero. Sensitivity analysis includes alternative measures of financial development, a variation of country samples as well as measures of institutional quality and export concentration as additional control variables.

In order to control for omitted variables, I use a panel specification with country and time fixed effects. This is possible since most variables change over time. More precisely, I run the following estimation with OLS:

$$FD_{ct} = \alpha + \beta\, EFNX_{ct} + \boldsymbol{\gamma} X_{ct} + \delta_c + \delta_t + \epsilon_{ct}, \tag{4}$$

with δ_c for country fixed effects and δ_t for time fixed effects. The panel specification is estimated on a sample of non-overlapping five-year and ten-year averages.

4.3 Causality

The estimations presented in the two previous subsections are prone to endogeneity problems since financial development may affect the right-hand side variables as well. It is thus important to carefully identify the direction of causality.

Concerning the relationship between financial development and natural resource abundance, the problem can be solved by using pure geographical measures of resource endowment. Financial markets are rather unlikely to affect measures that refer to the actual subsoil wealth.

However, in the case of estimating equations (3) and (4), which relate financial development to the external finance need of exports, it is more complicated to control for endogeneity. A country's level of financial development will certainly influence its trade structure. This view has been supported by a number of studies in the finance and trade literature. They show that in the presence of credit constraints, quality and size of financial markets may be a source of comparative advantage, thereby offering an additional explanation for international trade patterns. Among others, Beck (2002) as well as Svaleryd and Vlachos (2005) find empirical evidence that a high level of financial development fosters exports in financially dependent industries.

In order to identify a causal link between the external finance need of a country's exports and the financial system, it is therefore necessary to accurately address the endogeneity problem. This is done with an instrumentation strategy that follows Do and Levchenko (2007, p.806). To overcome endogeneity, we need a variable that is highly correlated with the original one, that is, the external finance need of exports, but uncorrelated with the error term. More precisely, this means finding an instrument for the trade structure, which is done with the gravity approach that has been proposed by Frankel and Romer (1999). These authors predict trade as a share of GDP on the basis of a gravity regression of bilateral trade volumes on merely geographical explanatory variables like distance and land area. The obtained coefficients are used to predict bilateral trade between country pairs. These figures are then summed up over all trading partners of a country in order to get the predicted total trade relative to GDP. While the analysis by Frankel and Romer (1999) is limited to the national level, Do and Levchenko (2007, p.806) modify the approach by also considering the sectoral level. Thus, they are able to predict a country's trade structure rather than just its general ratio of trade to GDP. Relying on Frankel and Romer (1999), the following

regression equation is estimated for each sector i:

$$\begin{aligned} LogEXP_{icd} = \alpha &+ \eta_i^1 ldist_{cd} + \eta_i^2 lpop_c + \eta_i^3 larea_c + \eta_i^4 lpop_d + \eta_i^5 larea_d \\ &+ \eta_i^6 landlocked_{cd} + \eta_i^7 border_{cd} + \eta_i^8 border_{cd} * ldist_{cd} \\ &+ \eta_i^9 border_{cd} * pop_c + \eta_i^{10} border_{cd} * area_c + \eta_i^{11} border_{cd} * pop_d \\ &+ \eta_i^{12} border_{cd} * area_d + \eta_i^{13} border_{cd} * landlocked_{cd} \\ &+ \eta_i^{14} subsoilintotalwealth_c + \eta_i^{15} subsoilintotalwealth_d + \epsilon_{cd}. \end{aligned} \quad (5)$$

The left-hand side variable $LogEXP_{icd}$ denotes the log of exports from country c to d relative to GDP in industry i.[8] Relating trade to sectoral GDP ensures that we control for a country's size. This is important since large countries tend to trade less with their neighbors, in relative terms, than small ones. For example, Germans surely engage extensively in trade with Germans, while Belgians trade comparatively less with their own countrymen as they have fewer fellow citizens to trade with (Frankel and Romer 1999, p.380). The geographical explanatory variables at the right-hand side include the log of bilateral distance between the two countries' major cities $ldist_{cd}$, the log of country c's population $lpop_c$, the log of its land area $larea_c$ and both variables for trade partner d, respectively. The dummy variable $landlocked_{cd}$ indicates whether none, one or both of the countries are landlocked by taking the value of zero, one or two. $border_{cd}$ is a common-border dummy. Since the presence of a common border will most likely alter the effect of all previous variables, the right-hand side also consists of interaction terms with $border_{cd}$. In addition to Do and Levchenko (2007), this paper adds $subsoilintotalwealth$, which denotes the subsoil in total wealth for both the exporter c and importer d (see Data Description 4.4).

The coefficients I obtain from these regressions by sector are then used to predict the log of exports to GDP in sector i from country c to d, $\widehat{LogEXP}_{icd}$.[9] Since the construction of the finance need of exports requires the sectoral export share in total exports, not sectoral bilateral exports, I take the exponential of $\widehat{LogEXP}_{icd}$, and sum over all trade

[8] See also di Giovanni and Levchenko (2009).

[9] Hats indicate predicted values.

partners ($d = 1, ..., D$):

$$\widehat{EXP_{ic}} = \sum_{d=1}^{D} e^{Log\widehat{EXP_{icd}}}, \qquad \text{where} \qquad d \neq c. \tag{6}$$

The predicted sectoral trade shares are obtained in the following manner:

$$\widehat{\omega}_{ic} = \frac{\widehat{EXP_{ic}}}{\sum_{i=1}^{I} \widehat{EXP_{ic}}}. \tag{7}$$

With predicted rather than actual trade shares of sectors, it is now possible to construct the instrument for the main right-hand side variable, external finance need of exports (Do and Levchenko 2007, p.807). Analogous to equation (2), the instrument is:

$$\widehat{EFNX_c} = \sum_{i=1}^{I} \widehat{\omega}_{ic} \; ED_i. \tag{8}$$

While trade literature shows that gravity approaches deliver astonishingly good predictions of actual trade volumes at the national level, one might be more reluctant towards a strategy predicting countries' trade structures with the corresponding sectoral disaggregation. In particular, it could be argued that the geographical determinants used as explanatory variables refer to the national level and do not vary across industries. However, since the gravity regression is estimated for each sector i, the estimated gravity coefficients η_i also differ across sectors and thus the predicted exports to GDP $\widehat{EXP_{ic}}$ within a country. The supposition is that goods with a highly negative coefficient on distance, for example, will be traded less with trading partners that are far away from the home country than other products. Other export goods might react sensitively to whether there is a common border between country c and d. That is, the sectors' export behavior is differently affected by the geographical determinants in the gravity equation (5). Obviously, significant variation of the gravity coefficients across industries is important for the instrumentation strategy to work. Whether this is indeed the case, is tested in Section 5. Do and Levchenko (2007) list both theoretical and empirical studies that support the view that these coefficients differ across sectors. Anderson and van Wincoop (2003, 2004) show, for example, that coefficients on distance and bor-

der depend on trade costs and the elasticity of substitution between product varieties within an industry. Both factors may well differ across sectors according to empirical literature.

Another potential objection to the approach might be the presence of zero trade observations when two countries do not trade in a particular sector. There is a high probability that two small countries that are far away from each other do not trade in every sector. Do and Levchenko (2007) find that this phenomenon is less of a problem. One reason is that trade patterns rather than volumes are estimated, and country pairs with no bilateral trade at all can be easily ignored. Nevertheless, the instrument may still be biased since the procedure predicts zero trade when it observes zero trade. The authors conduct a number of robustness checks to avoid this problem and find convincing evidence that zero trade observations are not a major concern for the instrumentation strategy.[10]

The instrument for the external finance need of exports is used in regression equation (3) with two-stage least squares (2SLS). While the approach is able to account for several important issues of endogeneity, two common restrictions, which apply to instruments, remain: a potential measurement error in regressors and the omitted-variable bias. The latter is captured in the panel analysis.

4.4 Data Description

In the following section, data and data sources are described in more detail. It presents the measures of financial development and resource abundance, the data to construct the external finance need of exports, the control variables as well as the different samples used.

[10] Among others, they estimate the gravity equation in levels applying a Poisson pseudo-maximum likelihood estimator with zero trade observations.

4.4.1 Financial Development

The present paper exploits the cross-country variation in finance. It is, therefore, crucial to use an appropriate measure of an economy's level of financial development. The most commonly used measure in the finance literature is the ratio of private (domestic) credit to GDP, that is, the amount of credit by banks and other private financial institutions to the private sector as a share of GDP (Rajan and Zingales 1998, p.569). As mentioned above, there is reason to assume that the quality of a financial system is a function of its size (Do and Levchenko 2007, p.799). A similar measure is the ratio of liquid liabilities to GDP (M2/GDP). Alternatively, it is possible to use a country's stock market trade value or stock market capitalization relative to GDP. While neither stock market measure reflects the *actual* amount of funding obtained by borrowers, these composites are considered to be suitable proxies for general financial development. In contrast, the stock market turnover ratio, defined as the value of total shares traded divided by the average real market capitalization, is a proxy for the stock market's activity and not for its size. The net interest margin, which is the accounting value of banks' net interest revenue as a share of interest-bearing assets, is another possibility for avoiding using the financial sector's size (Do and Levchenko 2007, p.821). Generally, the measures presented here are positively correlated, with the exception of the net interest margin, where a low value suggests a well-developed financial system. All measures are taken from Beck and Demirgüç-Kunt (2009).

4.4.2 Resource Abundance

Measures of resource abundance include the share of natural resources—that is, coal, oil and gas, metal ores and other mining products—in total (manufacturing and natural resources) exports. Alternatively, I use the share of oil and natural gas exports in total exports. I calculate both measures on the basis of the below trade data. Also, more pure measures of a country's resource endowment are used. These are subsoil wealth per capita and subsoil wealth in total national wealth provided by the World Bank (2006). Subsoil wealth includes oil, natural gas, coal and mineral resources, while

total wealth includes all natural assets (e.g., forests) as well as produced capital and intangible capital.[11]

4.4.3 External Finance Need of Exports

Data for the sectors' financial dependence, that is, inventories to sales and the RZ-type measure, come from Hattendorff (2012).

International trade data are taken from both the World Trade Database (Feenstra, Lipsey, Deng, Ma and Mo 2005) for the time period 1970 to 2000 and UN Comtrade for 2001 to 2007. These databases capture a large majority of bilateral trade flows and provide data classified by the four-digit Standard International Trade Classification (SITC) Revision 2. Since financial dependence data are classified by ISIC Rev. 2, trade data are converted to (three-digit) ISIC Rev. 2 as well. This is partly done with a correspondence table developed by Muendler (2009). The convergence allows for constructing the measure of external finance need of exports $EFNX$. In addition, these data are used to calculate the export concentration variables for robustness checks.

The same sources of trade data are used for the left-hand side variable of the gravity equation, where the additionally required GDP data at the sectoral level come from the United Nations Industrial Development Organization's database INDSTAT4 and the UNIDO publication "World Statistics on Mining and Utilities" (2010). Data are again converted to three-digit ISIC Rev. 2. Due to small inconsistencies in the matching of the sector classifications ISIC Rev. 2 and 3, the plastic products sector (356) has to be dropped here. A database from Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) provides geographical data for the right-hand side variables that reflect bilateral distances between two countries' major cities, land area as well as information on whether a country is landlocked and whether two countries share a border (Head, Mayer and Ries 2010). Data on population come from the World Bank's "World Development Indicators."

[11] Van der Ploeg and Poelhekke (2010) argue that measures of subsoil wealth could also be endogenous in growth regressions due to specific assumptions made for their calculation. Wealthy countries tend to have higher values of subsoil wealth per capita according to World Bank figures.

4.4.4 Further Variables

The control variables real GDP per capita (PPP adjusted) and trade openness (sum of imports and exports as a share of GDP) come from the Penn World Tables (Heston, Summers and Aten 2011). Data on the legal system are based on La Porta, Lopez-de-Silanes, Shleifer and Vishny (1998).

Further robustness checks require measures of institutional quality. This information is provided by the Polity IV index (Marshall, Jaggers and Gurr 2011), which captures the strength of democracy on a scale from -10 to 10. Second, the size of government, which is proxied by government consumption spending to GDP (from Penn World Tables), and where a high value indicates a low quality of institutions. Third, the property rights index by the Heritage Foundation capturing the protection of private property on a scale from 0.1 to 1. And fourth, the Economic Freedom of the World Index (Gwartney, Lawson and Hall 2012), which is a composite including 42 components of the categories government size, legal system, property rights, sound money (among others, inflation), freedom to trade internationally as well as flexible regulations (credit market, labor market, doing business).

4.4.5 Samples

Different samples are used in the analysis. The first sample for the regression of financial development on natural resource abundance consists of 78 countries for the time period 1970 to 2007, while the second one covers 84 countries. The latter captures a shorter time period, from 1992 to 2007, which makes it possible to include a number of former socialist economies. The corresponding samples for the regression of financial development on the external finance need of exports are somewhat larger: 93 and 110 countries. The sample used for the 2SLS estimation consists of only 33 countries from 1992 to 2007 due to limited sectoral GDP data, especially for figures on resources. A list of countries is depicted in Appendix Table 14.

5 Results

This section presents the empirical results. The first part deals with the relation between a country's level of financial development and its natural resource abundance. The second part relates financial development and the aggregated credit demand of a country in a cross-section and in a panel specification, and it reports the results of the instrumentation strategy. As indicated in Section 3, I focus on a scenario where firms' financial dependence is measured by inventories to sales. Further robustness checks test whether institutional quality or export concentration are important for the analysis.

5.1 Financial Development and Resource Abundance

As outlined in Section 3, it is reasonable to test empirically whether there is a negative relationship between resource abundance and a country's financial system before investigating a possible mechanism of the financial channel in more detail. I run cross-sectional OLS regressions with a sample of 78 countries, estimating equation (1) with various measures of financial development and resource abundance. In order to mitigate the problem of an unbalanced panel, averages of all variables from 1970 to 2007 are taken. The results are reported in Table 2 with robust standard errors in parentheses and where the columns represent different specifications. The first specification is a simple bivariate regression of financial development on resource abundance measured by private credit to GDP and the export share of resources, respectively. The coefficient on resource abundance is -0.463 and significant at the 1% level. The following specifications add other variables suited for explaining a country's level of financial development such as income per capita and trade openness (Column 2). It does not come as a surprise that wealth is positively correlated with a large private credit market. Trade openness appears to be insignificant. The coefficient on resource abundance remains significantly negative. This is also true in Column 3, including legal origin dummies, where the R^2 is 0.71.

Financial Development and Resource Abundance
OLS Cross-section, Averages, 1970-2007

	(1)	(2)	(3)	(4)
Dep. Var. (FD)	Pr.Credit/GDP	Pr.Credit/GDP	Pr.Credit/GDP	Pr.Credit/GDP
Resource Abundance Measure	Export Share of Resources	Export Share of Resources	Export Share of Resources	Export Share of Resources
Resource Abundance	-0.463^{***}	-0.245^{**}	-0.173^{**}	-0.239^{***}
	(0.092)	(0.075)	(0.072)	(0.081)
Log(Income)		0.183^{***}	0.156^{***}	0.175^{***}
		(0.019)	(0.021)	(0.024)
Log(Trade Openness)		0.039	0.040	0.030
		(0.056)	(0.047)	(0.047)
British Legal Origin			0.013	0.426^{***}
			(0.107)	(0.080)
French Legal Origin			-0.112	0.282^{***}
			(0.102)	(0.069)
Socialist Legal Origin			-0.354^{***}	
			(0.096)	
German Legal Origin			0.378^{*}	0.785^{***}
			(0.135)	(0.139)
Scandinavian Legal Origin				0.414^{***}
				(0.111)
Polity IV				-0.008
				(0.005)
Constant	0.555^{***}	-1.224^{***}	-0.971^{***}	-1.446^{***}
	(0.053)	(0.230)	(0.258)	(0.217)
Observations	78	78	78	77
R^2	0.14	0.57	0.71	0.70

Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level. Variables are averaged over the period 1970-2007. In all specifications, financial development (FD) is measured by private credit to GDP, while resource abundance is captured by the export share of resources. Log(Income) is the log of real GDP per capita, and Log(Trade Openness) is the log of total trade to GDP (both from Penn World Tables). The legal origin dummies come from La Porta, Lopez-de-Silanes, Shleifer and Vishny (1998). The index Polity IV measures the strength of democratic institutions (Marshall, Jaggers and Gurr 2011).

Table 2

In the context of the resource curse, it is often argued that institutions play an important role (see Section 2). For this reason, I control for institutional quality using the Polity IV index, which is frequently applied in the literature. As can be seen in Column 4, however, this variable does not have a significant effect on the left-hand side variable.[12] It seems that the negative relationship between financial system and resources cannot simply be explained by institutional shortcomings. The coefficient on resource abundance remains significant when government size as a measure of institutional quality is used. With a measure of economic freedom or of property rights, the results are ambiguous, but do not generally contradict the negative link between

[12]It remains insignificant when the legal origin dummies are dropped.

finance and resources (not depicted in the tables).

Furthermore, I check the robustness of these results using alternative measures of resource abundance. The results of a specification with control variables income per capita, trade openness and legal origin are depicted in Table 3. When resource abundance is measured by the export share of just oil and natural gas without mining products, the negative relationship found above is stronger (Column 1). As indicated in the description of methods, it is even more important to vary the resource variable using a pure, exogenous measure such as subsoil wealth per capita or the share of subsoil in total wealth in order to overcome the simultaneity problem of the export shares of resources used so far. Both coefficients on the main right-hand side variable (Column 2 and 3) are negative and significant, as before. The magnitude of the coefficient on pure subsoil wealth per capita, however, is very low.

In addition, the measures of financial development are varied. In detail, these are the ratios of liquid liabilities, stock market trade value and stock market capitalization to GDP, the stock market turnover ratio and the net interest margin. Selected results using two of them, the stock market trade value to GDP and the stock market turnover ratio, are depicted in Table 3, with wealth, trade openness and legal origin dummies as control variables. Still, coefficients on resource abundance are negative and significantly different from zero with values of -0.196 and -0.315. However, other combinations of financial development and resource abundance measures deliver less significant results and R^2 tends to shrink (not depicted in the tables).

The same analysis is conducted for a sample covering the period 1992 to 2007, which includes a number of former Soviet countries. Appendix Table 9 shows the specifications as in Column 3 of Table 2, with income per capita, openness and legal origin as controls. Again, measures of resource abundance and financial development are varied. Overall, the results are in line with the findings from above.

Thus, we can state that resource-abundant countries tend to have a less developed financial system. In the majority of regressions, the size of the effect does not appear to be negligible. Generally, measures of resource abundance that refer to the export structure show a stronger negative correlation with financial development than measures of

Financial Development and Resource Abundance
Robustness, OLS Cross-section, Averages, 1970-2007

	(1)	(2)	(3)	(4)	(5)
Dep. Var. (FD)	Pr.Credit/GDP	Pr.Credit/GDP	Pr.Credit/GDP	Stock Market Trade Value/GDP	Stock Market Turnover Ratio
Resource Abundance Measure	Export Share of Oil and Gas	Subsoil Wealth p.c.[a]	Subsoil in Total Wealth	Export Share of Resources	Export Share of Resources
Resource Abundance	-0.217^{***}	$-1 * 10^{-5***}$	-0.172^{**}	-0.196^{**}	-0.315^{**}
	(0.062)	$(3.2 * 10^{-6})$	(0.073)	(0.092)	(0.132)
Other Controls	Log(Income), Log(Trade Openness), Legal Origin Dummies				
Constant	-0.998^{***}	-1.534^{***}	-1.074^{***}	-0.825^{*}	0.578
	(0.257)	(0.237)	(0.256)	(0.433)	(0.594)
Observations	78	77	78	65	65
R^2	0.72	0.71	0.71	0.46	0.44

Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level. Variables are averaged over the period 1970-2007. The resource abundance measure is varied using the export share of resources (4 and 5), the export share of oil and gas (1), subsoil wealth per capita (2) and subsoil in total wealth (3). Selected measures of financial development (FD) are private credit to GDP (1 to 3), the stock market trade value to GDP (4) and the stock market turnover ratio (5). Log(Income) is the log of real GDP per capita, and Log(Trade Openness) is the log of total trade to GDP (both from Penn World Tables). The legal origin dummies come from La Porta, Lopez-de-Silanes, Shleifer and Vishny (1998). [a] Without Norway, which is a strong outlier.

Table 3

pure subsoil wealth. Resource dominance as opposed to general resource wealth seems to harm finance. These results are basically in line with Yuxiang and Chen (2011), Beck (2011) and Kurronen (2012).[13]

5.2 Financial Development and External Finance Need of Exports

Armed with this finding, we can now turn to an empirical investigation of a mechanism that is able to explain why resource-rich and, in particular, resource-dominated countries tend to have a less developed financial system. As described in Section 3, the

[13]The presented analysis is confined to a cross-section of countries here. The above literature, which also uses panel data, suggests that resources are essentially associated with lower bank-based financial development, as captured by private credit to GDP. The negative link between resources and stock markets is less pronounced.

external dependence of resource sectors may play a role. The hypothesis to be tested is whether credit demand by sectors, proxied by the (short-term) external finance need of exports, affects a country's financial development.

5.2.1 Cross-sectional Analysis

Financial Development and External Finance Need of Exports
OLS Cross-section, Averages, 1970-2007

	(1)	(2)	(3)	(4)
Dep. Var. (FD)	Pr.Credit/GDP	Pr.Credit/GDP	Pr.Credit/GDP	Stock Market Capitalization/GDP
EFNX	1.900***	2.500***	1.976***	2.693**
	(0.686)	(0.526)	(0.501)	(1.164)
Log(Income)		0.188***	0.171***	0.219***
		(0.018)	(0.019)	(0.036)
Log(Trade Openness)		0.079	0.075	0.220**
		(0.056)	(0.050)	(0.090)
British Legal Origin			0.049	0.328**
			(0.106)	(0.161)
French Legal Origin			−0.041	−0.052
			(0.098)	(0.121)
Socialist Legal Origin			−0.249***	−0.057
			(0.093)	(0.184)
German Legal Origin			0.372***	0.071
			(0.139)	(0.294)
Constant	0.198***	−1.787***	−1.568***	−2.774***
	(0.066)	(0.266)	(0.321)	(0.723)
Observations	93	93	93	76
R^2	0.05	0.61	0.70	0.52

Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level. Variables are averaged over the period 1970-2007. In specifications 1 to 3, financial development (FD) is measured by private credit to GDP, while 4 uses stock market capitalization to GDP. $EFNX$ is the external finance need of exports, which is calculated using inventories to sales. Log(Income) is the log of real GDP per capita, and Log(Trade Openness) is the log of total trade to GDP (both from Penn World Tables). The legal origin dummies come from La Porta, Lopez-de-Silanes, Shleifer and Vishny (1998).

Table 4

a. Ordinary Least Squares (OLS) Regression

The first cross-sectional OLS regressions are conducted with a sample of 93 countries and data averages over 38 years, that is, from 1970 to 2007. The results are shown in Table 4, with robust standard errors in parentheses. In Column 1, financial development (private credit to GDP) is regressed on the external finance need of exports, that is, on the economy's aggregate credit demand of firms. Firms' financial dependence

ED_i from equation (2) is measured by inventories to sales. The coefficient on the right-hand side variable $EFNX$ is 1.900 and significant at the 1% level. The R^2, however, is rather low. Columns 2 and 3 present the results of specifications including the control variables income per capita, trade openness and legal origin dummies. As expected, wealth is positively related to the size of the credit market. Trade openness, however, is insignificant in all specifications. Column 3 shows that especially a socialist legal origin negatively affects the financial system. Here, the $EFNX$ variable is still significant at the 1% level ($\beta = 1.976$), and R^2 is much higher than in the first specification.

In order to check these estimates for robustness, alternative measures of financial development are applied instead of private credit to GDP. As in Section 5.1, this includes the ratios of liquid liabilities, stock market trade value and stock market capitalization to GDP, the stock market turnover ratio and the net interest margin. The regression result with stock market capitalization is demonstrated in Table 4 in Column 4. Overall, the results are mixed. With liquid liabilities and stock market capitalization to GDP, the coefficients on $EFNX$ are positive and significant as above, even though the R^2 is only at around 0.50. The coefficients are insignificant, however, when the financial system's quality is proxied by the other three measures (not depicted in the tables).

Nevertheless, in the cross-section, there is some evidence that the external finance need of exports measured by short-term financial dependence might be correlated with financial development. This result would, indeed, suggest a credit demand channel of the resource curse.[14]

Furthermore, I run all regressions and robustness checks described above with a sample including more countries (110) at the expense of a shorter time period covered (1992 to 2007). The results obtained from these estimations are strongly in line with those from the 1970-2007 sample. Again, the external finance need of exports with inventories to sales is significantly related to financial development.

[14] $EFNX$ is clearly insignificant in all specifications when it is calculated with the Rajan-Zingales-type measure instead of inventories to sales. This result continues to hold when the exact calculation of cash flow is varied, as proposed in Hattendorff (2012).

b. Instrumentation Strategy

As outlined in Section 4.3, the external finance need of exports, the main right-hand side variable, may be endogenous. That is, the trade structure could be influenced by financial development itself. The results of the instrumentation strategy are presented below.

The approach allows only cross-sectional analysis, and limited availability of data leads to a smaller sample covering fewer countries over a shorter time period. More precisely, I use a sample with 33 countries from 1992 to 2007. First, I estimate the gravity equation (5) at the sectoral level, that is, for each of the 32 sectors. The data are averaged over the whole period. The estimation results with all relevant variables are depicted in the Appendix Tables 10 to 13, where each column represents an industry. The number of observations differs across the sector-level gravity regressions, ranging from 350 (coal mining) to $2,542$ (machinery). The R^2s are between 0.19 and 0.56.

How can we interpret the sectors' coefficients on the geographical determinants? As expected, distance clearly mitigates the ratio of bilateral exports to GDP. The farther away countries are, the less they trade with each other. According to Frankel and Romer (1999, p.384), the coefficients on the exporter's population and area are supposed to be negative, too, since agents in large countries, such as the United States, have more opportunities to trade with their fellow citizens and are farther away from customers beyond their own border. This distance argument is also applied to explain why the importer's land area negatively affects bilateral trade to GDP. These predictions are only partly supported by the data from my gravity estimation. On the other hand, a large population of the importer provides good market opportunities and increases bilateral exports significantly. Not surprisingly, landlocked countries trade considerably less. A common border tends to increase bilateral trade, whereas this is less obvious when border interaction terms are included in the regression. Overall, the coefficients' size and signs correspond rather well to those obtained by Frankel and Romer (1999) at the aggregate national level.

Do and Levchenko (2007) point out that the gravity coefficients have to differ across

industries. Since all geographical right-hand side variables are the same in the set of industry-level estimations, predicted trade values would just be the same, too, if η^{1-15} were equal across sectors. However, comparing the coefficients in Appendix Tables 10 to 13 shows that they differ significantly in magnitude. For example, η^1 on $ldist_{cd}$ (log of bilateral distance) ranges from -1.998 to -0.436. Thus, expanding the Frankel-Romer approach to a sector-level analysis is possible. Armed with the fifteen estimates on the geographical variables, I predict bilateral exports as a share of GDP for each industry and country, and calculate the predicted external finance need of exports as described in Section 4.

The 2SLS regression results are presented in Table 5, where $EFNX$ calculated with inventories to sales is instrumented by $\widehat{EFNX}$ and the corresponding controls. Column 1 reports a simple bivariate regression, while the other columns add the set of control variables that are known from above. The bottom panel refers to the first stage of the estimation. The coefficient on $\widehat{EFNX}$ ranges from 1.754 to 2.585 and is significant at the 10% level or at the 5% level. The partial R^2s are between 0.14 and 0.22. The partial F-statistics range from rather low 2.89 to 4.82. The second-stage outcomes are presented in the top panel of Table 5. The coefficient on $EFNX$ is clearly insignificant in the bivariate regression (t-statistics of 0.39). With the additional control variables income per capita and trade openness, it is significant at the 1% level and very high in magnitude (5.467). Including legal origin dummies increases the coefficient even further, but lowers significance. The variation of financial development measures does not alter this finding substantially (the specifications with stock market capitalization and the stock market trade value are depicted in the table).[15] So, by and large, the external finance need of exports calculated with inventories to sales seems to increase a country's financial development. This corresponds to the outcome of the cross-sectional OLS analysis above.

[15]When $EFNX$ is calculated with the RZ-type measure, the instrumentation strategy fails, as indicated by the weak instrument diagnostics.

Financial Development and External Finance Need of Exports
2SLS Cross-section, Averages, 1992-2007

	(1)	(2)	(3)	(4)	(5)
Panel A: 2nd Stage					
Dep. Var. (FD)	Pr.Credit /GDP	Pr.Credit /GDP	Pr.Credit /GDP	Stock Market Capitalization /GDP	Stock Market Trade Value/GDP
EFNX	1.482	5.467***	7.138**	6.431**	6.231**
	(3.763)	(1.968)	(2.970)	(3.370)	(3.005)
Log(Income)		0.351***	0.233**	0.123	0.139**
		(0.067)	(0.095)	(0.117)	(0.069)
Log(Trade Openness)		−0.035	0.087	−0.039	−0.102
		(0.100)	(0.116)	(0.126)	(0.121)
British Legal Origin			−0.011	0.742***	0.275
			(0.188)	(0.237)	(0.307)
French Legal Origin			−0.270*	0.197	0.052
			(0.156)	(0.134)	(0.269)
Socialist Legal Origin			−0.545**	0.020	−0.085
			(0.212)	(0.228)	(0.299)
Scandinavian Legal Origin			−0.170	0.446**	0.313
			(0.210)	(0.163)	(0.272)
Constant	0.491	−3.231***	−2.579**	−1.588	−1.401
	(0.445)	(0.732)	(0.973)	(1.083)	(1.080)
Panel B: 1st Stage					
Dep. Var.	EFNX	EFNX	EFNX	EFNX	EFNX
$\widehat{EFNX}$	1.754*	1.857*	2.540**	2.585**	2.585**
	(1.033)	(0.915)	(1.157)	(1.181)	(1.181)
Partial F-Test	2.89	4.12	4.82	4.79	4.79
Partial R^2	0.14	0.15	0.22	0.22	0.22
Observations	33	33	33	34	34

Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level. Variables are averaged over the period 1992-2007. In specifications 1 to 3, financial development (FD) is measured by private credit to GDP, while 4 uses stock market capitalization, and 5 the stock market trade value. $EFNX$ is the external finance need of exports, which is calculated using inventories to sales. Log(Income) is the log of real GDP per capita, and Log(Trade Openness) is the log of total trade to GDP (both from Penn World Tables). The legal origin dummies come from La Porta, Lopez-de-Silanes, Shleifer and Vishny (1998). $\widehat{EFNX}$ is the predicted $EFNX$ based on a gravity approach with geographical data.

Table 5

5.2.2 Panel Analysis

In the following, the results of the panel analysis are presented. The procedure makes it possible to add a time-series dimension to the data and to control for omitted variables that have not been considered in the cross-sectional estimation. As outlined in Section 4, both country and time fixed effects are applied. Hence, it is possible to control for

unobserved time-invariant characteristics that are specific to a country, and for changes over time in the global environment (Do and Levchenko 2007, p.824). A robust version of the Hausman specification test shows a high chi-squared statistic with a p-value close to zero. This means a fixed-effects approach is preferred to random effects. Obviously, the assumption that random effects are orthogonal to the regressors does not hold here. Due to limited data, regression equation (4) is estimated with OLS only.

Table 6 reports the regression results with a sample from 1970 to 2007 with non-overlapping five-year averages, that is, 1970-1974, 1975-1979 etc., where the last average covers only three years, 2005-2007. Taking five-year averages mitigates the problem of an unbalanced panel and filters out short-run business cycle fluctuations (see, e.g., Huang and Temple 2005, p.12). In order to control for both heteroskedasticity and autocorrelation, standard errors clustered at the country level are applied. In contrast to the previous estimations, only controls that vary over time can be used. This excludes the variables capturing legal origin. Columns 1 and 2 show the estimations with private credit to GDP. As expected, the log of income per capita is again significant with a coefficient of 0.351. Trade openness is significant now, too. It does not come as a surprise that the (overall) R^2s are relatively high in all fixed-effects regressions. Remarkably, the coefficient on the external finance need of exports with inventories to sales is insignificant here.[16]

Varying the measures of financial development using the ratios of M2, stock market trade value and stock market capitalization to GDP, the stock market turnover ratio and the net interest margin rather confirms this finding (selected measures in Table 6 in Column 3 and 4).[17] The above panel analysis is repeated with ten-year averages instead of five-year averages. It turns out that these outcomes generally support the ones previously obtained. The same is true for specifications with five-year averages and lagged regressors using first and second lags (not depicted in the tables).[18] As in the cross-section, I also use a sample covering the period from 1992 to 2007 that

[16]The coefficient on the RZ-type $EFNX$ is positive and significant at the 1% level, which corresponds to the one obtained by Do and Levchenko (2007).

[17]In particular, there is no evidence that $EFNX$ calculated with the short-term measure is more correlated with credit market indices, or RZ-type $EFNX$ with stock market indices, or vice versa.

[18]A GMM (generalized method of moments) approach following Arellano and Bond (1991) fails to provide valid instruments.

Financial Development and External Finance Need of Exports
OLS Panel Estimation, 5 Year Averages, 1970-2007

	(1)	(2)	(3)	(4)
Dep. Var. (FD)	Pr.Credit/GDP	Pr.Credit/GDP	M2/GDP	Stock Market Capitalization /GDP
EFNX	0.546	0.268	0.566	1.059
	(0.687)	(0.650)	(0.446)	(1.788)
Log(Income)		0.351***	0.189***	0.235*
		(0.055)	(0.044)	(0.133)
Log(Trade Openness)		0.122**	0.062*	0.128
		(0.050)	(0.034)	(0.129)
Country Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
Observations	679	673	671	369
No. of Countries	93	93	93	76
R^2	0.80	0.84	0.90	0.84

Standard errors clustered at the country level are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level. Non-overlapping five-year averages from 1970 to 2007. In specifications 1 and 2, financial development (FD) is measured by private credit to GDP, while 3 uses liquid liabilities to GDP, and 4 stock market capitalization to GDP. $EFNX$ is the external finance need of exports, which is calculated using inventories to sales. Log(Income) is the log of real GDP per capita, and Log(Trade Openness) is the log of total trade to GDP (both from Penn World Tables).

Table 6

includes many of the former socialist countries. This allows only five-year averages to be taken. The results, which are not reported in the tables, basically correspond to those from before.[19]

In summary, we can say that controlling for omitted variables brings with it a considerable change of results. When a country's external finance need is calculated with inventories to sales, it does not have a significant influence on financial development. This contradicts the finding from 5.2.1.[20]

5.2.3 Interpretation of Results

As indicated above, the estimations deliver different results with regard to the link between financial development and external credit demand. In the cross-sectional

[19]Some financial development variations provide too few observations to conduct meaningful estimations.

[20]The exclusion of poor countries does not alter the results.

analysis, the external finance need of exports ($EFNX$) calculated with inventories to sales enters significantly in basically all specifications. This is true for both ordinary least squares and two-stage least squares, and seems to confirm the hypothesis that resource-based economies have lower financial development due to lower credit demand. By contrast, the panel estimations in 5.2.2 show that $EFNX$ calculated with the short-term measure is clearly insignificant. This points to omitted variables in the cross-section, which are partly controlled for in the fixed-effects estimation. Several variables could come into question.

Financial Development and External Finance Need of Exports
Quality of Institutions and Export Concentration, OLS Cross-section, Averages, 1970-2007

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Var. (FD)	Pr.Credit /GDP	Pr.Credit /GDP	Pr.Credit /GDP	Pr.Credit /GDP	Pr.Credit /GDP	Pr.Credit /GDP
EFNX	1.632***	2.078***	1.435***	0.362	0.602	0.402
	(0.417)	(0.497)	(0.517)	(0.502)	(0.555)	(0.593)
Polity IV	−0.0002					
	(0.005)					
Government Size		−0.008**				
		(0.004)				
Property Rights			0.425**			
			(0.165)			
Economic Freedom Index				0.145***		
				(0.038)		
Concentration Ratio (4)					−0.686***	
					(0.175)	
Log(Herfindahl-Hirschman Index)						−0.172***
						(0.044)
Other Controls	Log(Income), Log(Trade Openness), Legal Origin Dummies					
Constant	−1.283***	−1.456***	−1.309***	−1.018***	−0.405	−1.114***
	(0.264)	(0.298)	(0.316)	(0.285)	(0.416)	(0.325)
Observations	90	93	93	88	93	93
R^2	0.71	0.71	0.72	0.74	0.74	0.74

Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level. Variables are averaged over the period 1970-2007. The measure of financial development (FD) is private credit to GDP. $EFNX$ is the external finance need of exports, which is calculated using inventories to sales. Log(Income) is the log of real GDP per capita, and Log(Trade Openness) is the log of total trade to GDP (both from Penn World Tables). The legal origin dummies come from La Porta, Lopez-de-Silanes, Shleifer and Vishny (1998). The quality of institutions is measured by the Polity IV index (Marshall, Jaggers and Gurr 2011), government size (government consumption spending to GDP, Penn World Tables), the property rights index by the Heritage Foundation as well as the Economic Freedom of the World Index (Gwartney, Lawson and Hall 2012). Export concentration is measured by the concentration ratio, which sums up the export shares of the four largest export sectors, as well as the log of the Herfindahl-Hirschman index, which sums up the square of export shares of all export sectors.

Table 7

As in the regression of financial development on natural resource abundance in 5.1, one may argue that institutions matter (see also Section 2). In order to control for institutional quality, several measures are applied: the Polity IV index for the strength of democracy, the size of government, the property rights index by the Heritage Foundation and the Economic Freedom of the World Index, which is a composite of the categories government size, legal system, property rights, sound money, freedom to trade internationally and flexible regulations. Table 7 reports the estimation results in the cross-section with private credit to GDP on the left-hand side. The right-hand side variables are $EFNX$, the measures of institutional quality and the standard set of controls, that is, national wealth, trade openness and legal origin. Variables are averaged over the period 1970 to 2007. Sample size and R^2 are similar to those above. Except from the Polity IV index, all institutional variables are significant and have the expected signs (Columns 1 to 4). Private property and the index of economic freedom enter positively, government size negatively. In particular, I am interested in the change of the coefficient on $EFNX$ in comparison to the estimations without the quality of institutions. Using Polity IV, government size or the property rights index, the external finance need of exports variable is still positive and significant. This result does not hold with the composite Economic Freedom Index (Column 4). However, if the index is substituted by the sub-composites of its categories, $EFNX$ is again significant (not depicted in the tables). All estimation results are generally robust to the variation of the financial development measure. Using the larger sample with averages from 1992 to 2007 as well as including institutional quality in the instrumentation strategy delivers similar outcomes. Thus, institutions are unlikely to be the omitted variable.

Countries with low external finance need of exports often have only few export sectors. This gives rise to the idea that export concentration—rather than short-term external credit demand—may negatively affect financial development. To control for this possible effect, two measures of export concentration are used: the concentration ratio, which sums up the export shares of the four largest export sectors, as well as the log of the Herfindahl-Hirschman index, which sums up the square of export shares of all export sectors (see, e.g., Agosin, Alvarez and Bravo-Ortega 2012). The effect of export concentration on financial development is estimated in a regression with the

standard set of controls and $EFNX$ (with inventories to sales) as the main right-hand side variable (see Table 7, Columns 5 and 6). The sample covers 93 countries, variables are averaged over the period 1970 to 2007. Tests show that multicollinearity is not an issue here. Both coefficients on export concentration are negative and significant, that is, lower diversification of exports is correlated with weaker financial markets. Furthermore, the proxy for short-term credit demand $EFNX$ is insignificant in both specifications. This corresponds to the findings of the panel analysis. The results basically hold when the measure of financial development or the sample (110 countries from 1992 to 2007) are varied. They continue to hold by and large when the equation is estimated with 2SLS, applying the predicted $EFNX$ as an instrument (not depicted in the tables).

Hence, export concentration might be the omitted variable, which was partly controlled for in the fixed-effects panel estimation. This additional result suggests that the hypothesis of lower credit demand causing weaker financial development in resource-based economies has to be rejected.

6 Conclusion

This paper argues that natural resource abundance might weaken a country's financial system. Since finance is considered to be important for economic growth, we can, therefore, say that the natural resource curse, among others, operates through the financial channel. I find a significant negative link between resource abundance, in particular resource dominance, and financial development, which confirms previous results found by the literature.

Furthermore, the study seeks to offer an explanation for this negative relationship between resources and finance. It assumes that a country's financial development is partly shaped by the external credit demand of its industry. According to the finance literature, sectors systematically differ in their dependence on the financial system due to technological characteristics in the production process. In particular, resource sectors appear to be financially independent when external dependence is

calculated with inventories to sales, a measure that captures short-term dependence. Thus, resource-based economies are expected to have lower (short-term) aggregate credit demand. If short-term credit demand influenced financial development, there would be good reason to believe that the resource curse operates through this channel.

The hypothesis is tested with an OLS regression in a cross-section of countries and in a panel specification with time and country fixed effects that also exploits the time variation in the variables. Furthermore, I estimate a 2SLS regression where aggregate credit demand is predicted using a gravity estimation with exogenous geographic determinants in order to overcome the endogeneity problem.

In a cross-section of 93 (110) countries with averages from 1970 to 2007 (1992 to 2007), the external finance need of exports ($EFNX$), the proxy for an economy's aggregate credit demand, is positively related to the level of financial development. This result is supported by the instrumentation strategy. When estimating panel specifications with similar samples, the opposite is true. $EFNX$ calculated with inventories to sales appears not to be significant. The results are robust to the variation of financial development measures, and robust to the inclusion of different control variables such as real GDP per capita and trade openness.

Thus, in the cross-section, there is evidence for a resource curse operating via a demand-side effect in the financial system. In contrast, the panel analysis does not support this hypothesis. This points to important omitted variables in the cross-section. While the consideration of a country's institutional quality does not alter the results, external finance need of exports is insignificant in all specifications when export concentration is included. This contradicts the main hypothesis and indicates that export concentration rather than credit demand of resource firms might explain the negative link between resources and finance.

Further research on the financial channel of the resource curse should concentrate on alternative explanations. Suggested theories such as interest groups preventing reforms will have to be explored in more detail. Also, explanations linked to export concentration and to a lack of economic diversity seem to provide an answer.

7 Appendix

Financial Dependence
Ranking of Sectors

RZ-type Measure	Inventories to Sales
(1)	(2)
Tobacco	**Crude petroleum and natural gas**
Footwear	Printing and publishing
Furniture	**Coal mining**
Printing and publishing	**Petroleum refineries**
Metal products	Beverages
Wood products	Drugs
Apparel	Industrial chemicals
Textile	Wood products
Paper and products	Furniture
Other chemicals	Paper and products
Machinery	Food products
Food products	Plastic products
Petroleum refineries	Motor vehicles
Iron and steel	Nonmetal products
Industrial chemicals	Office and computing
Plastic products	Other chemicals
Electric machinery	Metal products
Other mining	**Other mining**
Coal mining	Nonferrous metal
Motor vehicles	Rubber products
Nonferrous metal	**Metal ore mining**
Transportation equipment	Iron and steel
Nonmetal products	Textile
Rubber products	Communication equipment
Beverages	Other industries
Communication equipment	Apparel
Other industries	Tobacco
Professional goods	Transportation equipment
Crude petroleum and natural gas	Petroleum and coal products
Office and computing	Machinery
Metal ore mining	Electric machinery
Petroleum and coal products	Professional goods
Drugs	Footwear

The table reports the ranking of natural resource and manufacturing sectors for both measures of financial dependence (in ascending order). (1) The RZ-type measure is calculated as $(CAPX_t - OANCF_t)/CAPX_t$, where $CAPX$ denotes capital expenditures and $OANCF$ net cash flow from operative activities (in Compustat items). (2) The ratio of inventories to sales is calculated as $INVT/SALE$. Sector classification is ISIC Rev. 2. See Hattendorff (2012).

Table 8

Financial Development and Resource Abundance
OLS Cross-section, Averages, 1992-2007

	(1)	(2)	(3)	(4)	(5)
Dep. Var. (FD)	Pr.Credit/GDP	Pr.Credit/GDP	Pr.Credit/GDP	Stock Market Trade Value/GDP	Stock Market Turnover Ratio
Resource Abundance Measure	Export Share of Resources	Subsoil Wealth p.c.	Subsoil in Total Wealth	Export Share of Resources	Export Share of Resources
Resource Abundance	-0.302^{***}	$-1 * 10^{-5**}$	-0.260^{**}	-0.337^{***}	-0.532^{***}
	(0.090)	$(4.3 * 10^{-6})$	(0.118)	(0.116)	(0.162)
Other Controls	Log(Income), Log(Trade Openness), Legal Origin Dummies				
Constant	-1.294^{***}	-1.495^{***}	-1.508^{***}	-0.707	0.784
	(0.330)	(0.349)	(0.323)	(0.497)	(0.659)
Observations	84	84	84	71	71
R^2	0.71	0.70	0.71	0.49	0.41

Robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level. Variables are averaged over the period 1992-2007. The resource abundance measure is varied using the export share of resources (1, 4 and 5), subsoil wealth per capita (2) and subsoil in total wealth (3). Selected measures of financial development (FD) are private credit to GDP (1 to 3), the stock market trade value to GDP (4) and the stock market turnover ratio (5). Log(Income) is the log of real GDP per capita, and Log(Trade Openness) is the log of total trade to GDP (both from Penn World Tables). The legal origin dummies come from La Porta, Lopez-de-Silanes, Shleifer and Vishny (1998).

Table 9

Gravity Approach
Sector-level Gravity Estimations, 1992-2007

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Sector (ISIC Rev. 2)	210	220	230	290	311	313	314	321	322
Dep. Var.	Log of bilateral exports to GDP $LogEXP_{icd}$								
$ldist_{cd}$	-1.031^{***}	-1.921^{***}	-0.865^{***}	-1.564^{***}	-1.496^{***}	-1.171^{***}	-1.452^{***}	-1.677^{***}	-1.998^{***}
	(0.203)	(0.190)	(0.162)	(0.077)	(0.061)	(0.075)	(0.094)	(0.057)	(0.072)
$lpop_c$	-1.602^{***}	-1.243^{***}	-0.473^{***}	0.242^{***}	-0.190^{***}	-0.217^{***}	-0.409^{***}	0.356^{***}	0.592^{***}
	(0.138)	(0.170)	(0.118)	(0.058)	(0.047)	(0.059)	(0.083)	(0.044)	(0.056)
$larea_c$	1.330^{***}	1.021^{***}	0.124	-0.032	0.045	-0.238^{***}	0.071	-0.318^{***}	-0.490^{***}
	(0.163)	(0.151)	(0.141)	(0.062)	(0.047)	(0.057)	(0.077)	(0.044)	(0.056)
$lpop_d$	0.613^{***}	0.435^{***}	0.800^{***}	0.849^{***}	0.527^{***}	0.151^{***}	-0.041	0.687^{***}	0.458^{***}
	(0.174)	(0.154)	(0.123)	(0.059)	(0.044)	(0.056)	(0.073)	(0.041)	(0.053)
$larea_d$	-0.081	0.258^{*}	-0.002	0.071	0.126^{***}	0.276^{***}	0.278^{***}	0.193^{***}	0.323^{***}
	(0.172)	(0.151)	(0.117)	(0.056)	(0.042)	(0.053)	(0.071)	(0.039)	(0.049)
$landlocked_{cd}$	-0.485	-2.183^{***}	-1.052^{**}	-1.133^{***}	-1.602^{***}	-0.761^{***}	-0.580^{**}	-1.235^{***}	-0.904^{***}
	(0.892)	(0.702)	(0.476)	(0.203)	(0.140)	(0.175)	(0.276)	(0.122)	(0.160)
$border_{cd}$	8.917	17.822^{***}	3.409	-2.687	5.394^{*}	6.477^{*}	6.223^{*}	-2.598	0.287^{*}
	(5.748)	(6.278)	(5.775)	(3.486)	(3.056)	(3.598)	(3.585)	(2.856)	(3.545)
$border_{cd} * ldist_{cd}$	0.040	0.756	-0.907	-0.052	0.924	0.583	0.344	1.247^{**}	0.810
	(0.984)	(1.258)	(1.000)	(0.643)	(0.564)	(0.662)	(0.660)	(0.528)	(0.654)
$border_{cd} * pop_c$	0.569	0.422	-0.059	-1.200^{***}	0.258	-0.082	0.268	-0.556	-0.701
	(0.604)	(0.765)	(0.690)	(0.428)	(0.381)	(0.447)	(0.448)	(0.356)	(0.441)
$border_{cd} * area_c$	-0.349	-1.113	0.291	1.024^{**}	-0.794^{**}	-0.405	-0.605	-0.132	-0.105
	(0.610)	(0.770)	(0.694)	(0.433)	(0.391)	(0.460)	(0.471)	(0.366)	(0.454)
$border_{cd} * pop_d$	0.824	0.073	0.236	0.452	-0.260	0.012	-0.135	0.214	-0.232
	(0.597)	(0.742)	(0.587)	(0.372)	(0.332)	(0.391)	(0.392)	(0.311)	(0.386)
$border_{cd} * area_d$	-0.747	-0.791	-0.044	-0.522	-0.020	-0.287	-0.024	-0.074	-0.041
	(0.675)	(0.770)	(0.613)	(0.400)	(0.354)	(0.415)	(0.423)	(0.331)	(0.410)
$border_{cd} * landl._{cd}$	0.569	-0.253	0.596	1.722^{**}	1.350^{**}	0.860	-0.843	1.560^{***}	1.154
	(1.284)	(1.342)	(1.126)	(0.749)	(0.637)	(0.750)	(0.773)	(0.594)	(0.738)
$lsubsoilintotalwealth_c$	-0.149	-0.099	-0.259^{***}	0.002	0.016	-0.160^{***}	-0.039	-0.049^{**}	0.117^{***}
	(0.095)	(0.076)	(0.067)	(0.029)	(0.021)	(0.027)	(0.035)	(0.020)	(0.026)
$lsubsoilintotalwealth_d$	-0.054	-0.238^{***}	-0.237^{***}	-0.187^{***}	-0.163^{***}	-0.207^{***}	-0.121^{***}	-0.199^{***}	-0.319^{***}
	(0.069)	(0.066)	(0.054)	(0.025)	(0.194)	(0.025)	(0.032)	(0.018)	(0.023)
Constant	-14.86^{***}	-8.785^{***}	-5.383^{**}	-0.246	-0.149	-2.044^{**}	-1.884	3.504^{***}	6.079^{***}
	(3.126)	(2.701)	(2.462)	(1.092)	(0.829)	(1.022)	(1.312)	(0.779)	(0.987)
Observations	350	631	834	1749	2403	2101	1221	2442	2286
R^2	0.39	0.29	0.24	0.40	0.40	0.31	0.32	0.50	0.44

Standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level. Variables are averaged over the period 1992-2007. Each column shows the results of a sector-level gravity estimation. The left-hand side variable $LogEXP_{icd}$ denotes the log of exports from country c to d relative to GDP in industry i. The geographical variables at the right-hand side include the log of bilateral distance between the two countries' major cities $ldist_{cd}$, the log of country c's population $lpop_c$, the log of its land area $larea_c$ and both variables for trade partner d, respectively. The dummy variable $landlocked_{cd}$ indicates whether none, one or both of the countries are landlocked by taking the value of zero, one or two. $border_{cd}$ is a common-border dummy. The following variables are interaction terms with $border_{cd}$. $lsubsoilintotalwealth$ is the log of subsoil wealth in total wealth for both the exporter and importer.

Table 10

Gravity Approach
Sector-level Gravity Estimations, 1992-2007

	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Sector (ISIC Rev. 2)	324	331	332	341	342	351	352	3522	353
Dep. Var.	Log of bilateral exports to GDP $LogEXP_{icd}$								
$ldist_{cd}$	-1.783^{***}	-1.843^{***}	-1.527^{***}	-1.974^{***}	-1.750^{***}	-1.432^{***}	-1.610^{***}	-1.290^{***}	-1.573^{***}
	(0.075)	(0.068)	(0.072)	(0.064)	(0.065)	(0.053)	(0.061)	(0.065)	(0.086)
$lpop_c$	0.437^{***}	-0.063	0.291^{***}	-0.140^{***}	0.674^{***}	0.154^{***}	0.257^{***}	0.191^{***}	-0.117^{*}
	(0.058)	(0.052)	(0.056)	(0.049)	(0.050)	(0.041)	(0.047)	(0.050)	(0.068)
$larea_c$	-0.394^{***}	0.133^{**}	-0.152^{***}	0.144^{***}	-0.481^{***}	-0.351^{***}	-0.400^{***}	-0.403^{***}	-0.553^{***}
	(0.059)	(0.053)	(0.057)	(0.048)	(0.049)	(0.039)	(0.046)	(0.052)	(0.062)
$lpop_d$	0.345^{***}	0.635^{***}	0.397^{***}	0.846^{***}	0.586^{***}	0.963^{***}	0.701^{***}	0.707^{***}	0.608^{***}
	(0.056)	(0.051)	(0.055)	(0.046)	(0.048)	(0.039)	(0.045)	(0.048)	(0.067)
$larea_d$	0.329^{***}	0.156^{***}	0.286^{***}	0.046	0.255^{***}	0.133^{***}	0.146^{***}	0.120^{***}	0.249^{***}
	(0.053)	(0.047)	(0.052)	(0.044)	(0.045)	(0.037)	(0.042)	(0.045)	(0.064)
$landlocked_{cd}$	-1.197^{***}	1.024^{***}	-0.685^{***}	-1.016^{***}	-1.111^{***}	1.453^{***}	-1.292^{***}	-0.752^{***}	-1.856^{***}
	(0.171)	(0.159)	(0.168)	(0.143)	(0.144)	(0.115)	(0.134)	(0.142)	(0.227)
$border_{cd}$	-0.163	3.672	5.390	-1.204	-4.523	-1.647	-4.488	0.086	-0.789
	(3.373)	(3.260)	(3.337)	(3.135)	(3.229)	(2.681)	(3.061)	(3.480)	(3.864)
$border_{cd} * ldist_{cd}$	0.999	1.398^{**}	0.439	0.972^{*}	0.665	0.405	0.717	0.302	-0.322
	(0.616)	(0.601)	(0.616)	(0.578)	(0.596)	(0.495)	(0.565)	(0.631)	(0.712)
$border_{cd} * pop_c$	-0.290	-0.456	-0.197	-0.662^{*}	-1.185^{***}	-0.668^{**}	-0.751^{**}	-0.123	-0.533
	(0.416)	(0.405)	(0.418)	(0.390)	(0.402)	(0.334)	(0.381)	(0.416)	(0.480)
$border_{cd} * area_c$	-0.472	-0.279	-0.502	0.303	0.753^{*}	0.372	0.256	-0.129	0.546
	(0.426)	(0.417)	(0.428)	(0.401)	(0.413)	(0.343)	(0.392)	(0.433)	(0.480)
$border_{cd} * pop_d$	-0.710^{**}	-0.060	-0.461	-0.116	0.209	-0.295	-0.277	-0.577	0.266
	(0.363)	(0.354)	(0.370)	(0.341)	(0.351)	(0.292)	(0.333)	(0.415)	(0.415)
$border_{cd} * area_d$	0.334	-0.533	0.098	-0.494	-0.406	-0.138	0.058	0.187	-0.193
	(0.385)	(0.377)	(0.391)	(0.363)	(0.374)	(0.310)	(0.354)	(0.392)	(0.447)
$border_{cd} * landl._{cd}$	1.499^{**}	0.911	1.479^{**}	1.421^{**}	1.628^{**}	1.628^{***}	1.549^{**}	0.818	2.119^{***}
	(0.696)	(0.680)	(0.696)	(0.653)	(0.672)	(0.557)	(0.637)	(0.682)	(0.794)
$lsubsoilintotalwealth_c$	-0.010	0.111^{***}	0.048^{*}	-0.152^{***}	-0.264	0.037^{**}	-0.157^{***}	-0.013	0.186^{***}
	(0.028)	(0.024)	(0.027)	(0.022)	(0.023)	(0.018)	(0.021)	(0.024)	(0.028)
$lsubsoilintotalwealth_d$	-0.240^{***}	-0.225^{***}	-0.234^{***}	-0.098^{***}	-0.182^{***}	-0.167^{***}	-0.122^{***}	-0.119^{***}	-0.158^{***}
	(0.024)	(0.022)	(0.023)	(0.020)	(0.021)	(0.017)	(0.020)	(0.021)	(0.029)
Constant	3.776^{***}	0.471	-2.206^{**}	2.192^{**}	2.208^{**}	3.703^{***}	4.689^{***}	2.967^{***}	5.415^{***}
	(1.034)	(0.933)	(1.006)	(0.866)	(0.887)	(0.718)	(0.829)	(0.918)	(1.168)
Observations	1853	2173	1967	2304	2339	2477	2384	2145	1643
R^2	0.41	0.44	0.35	0.49	0.46	0.56	0.48	0.39	0.44

Standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level. Variables are averaged over the period 1992-2007. Each column shows the results of a sector-level gravity estimation. The left-hand side variable $LogEXP_{icd}$ denotes the log of exports from country c to d relative to GDP in industry i. The geographical variables at the right-hand side include the log of bilateral distance between the two countries' major cities $ldist_{cd}$, the log of country c's population $lpop_c$, the log of its land area $larea_c$ and both variables for trade partner d, respectively. The dummy variable $landlocked_{cd}$ indicates whether none, one or both of the countries are landlocked by taking the value of zero, one or two. $border_{cd}$ is a common-border dummy. The following variables are interaction terms with $border_{cd}$. $lsubsoilintotalwealth$ is the log of subsoil wealth in total wealth for both the exporter and importer.

Table 11

Gravity Approach
Sector-level Gravity Estimations, 1992-2007

Sector (ISIC Rev. 2)	(19) 354	(20) 355	(21) 356[a]	(22) 369	(23) 371	(24) 372	(25) 381	(26) 382	(27) 3825
Dep. Var.	Log of bilateral exports to GDP $LogEXP_{icd}$								
$ldist_{cd}$	-0.436^{***}	-1.489^{***}		-1.617^{***}	-1.688^{***}	-1.571^{***}	-1.786^{***}	-1.364^{***}	-1.545^{***}
	(0.167)	(0.060)		(0.063)	(0.062)	(0.074)	(0.058)	(0.051)	(0.066)
$lpop_c$	-0.981^{***}	0.476^{***}		0.438^{***}	0.013	-0.242^{***}	0.491^{***}	0.147^{***}	-0.165^{***}
	(0.134)	(0.045)		(0.049)	(0.048)	(0.057)	(0.045)	(0.039)	(0.049)
$larea_c$	0.249^{*}	-0.463^{***}		-0.237^{***}	-0.098^{**}	0.037	-0.357^{***}	-0.170^{***}	-0.195^{***}
	(0.127)	(0.045)		(0.049)	(0.046)	(0.059)	(0.044)	(0.038)	(0.050)
$lpop_d$	0.168	0.461^{***}		0.538^{***}	0.768^{***}	1.042^{***}	0.593^{***}	0.719^{***}	0.693^{***}
	(0.142)	(0.044)		(0.046)	(0.045)	(0.055)	(0.042)	(0.036)	(0.048)
$larea_d$	0.178	0.305^{***}		0.208^{***}	0.124^{***}	0.092^{*}	0.200^{***}	0.180^{***}	0.219^{***}
	(0.140)	(0.041)		(0.044)	(0.042)	(0.052)	(0.040)	(0.035)	(0.046)
$landlocked_{cd}$	-1.527^{**}	-1.099^{***}		-0.978^{***}	-2.123^{***}	-1.461^{***}	-1.538^{***}	-1.418^{***}	-0.865^{***}
	(0.660)	(0.132)		(0.144)	(0.140)	(0.174)	(0.126)	(0.109)	(0.141)
$border_{cd}$	0.849	-2.089		-0.596	-1.343	2.683	-3.964	-2.308	1.926
	(5.047)	(2.904)		(3.030)	(3.052)	(3.508)	(2.961)	(2.614)	(3.209)
$border_{cd} * ldist_{cd}$	-1.500	0.670		1.139^{**}	0.637	0.934	0.954^{*}	0.939^{*}	0.714
	(0.957)	(0.551)		(0.559)	(0.563)	(0.646)	(0.547)	(0.483)	(0.613)
$border_{cd} * pop_c$	0.720	-0.752^{**}		-0.490	-0.716^{*}	-0.605	-0.826^{**}	-0.471	-0.409
	(0.604)	(0.363)		(0.377)	(0.380)	(0.436)	(0.369)	(0.326)	(0.401)
$border_{cd} * area_c$	-0.190	0.186		-0.101	0.134	-0.150	0.241	0.016	-0.283
	(0.635)	(0.382)		(0.387)	(0.391)	(0.448)	(0.379)	(0.335)	(0.425)
$border_{cd} * pop_d$	0.007	-0.100		-0.327	-0.119	0.043	-0.263	-0.387	-0.084
	(0.600)	(0.320)		(0.329)	(0.332)	(0.381)	(0.322)	(0.285)	(0.355)
$border_{cd} * area_d$	0.729	-0.070		-0.156	-0.101	-0.302	-0.103	-0.058	-0.059
	(0.601)	(0.346)		(0.350)	(0.353)	(0.405)	(0.343)	(0.303)	(0.384)
$border_{cd} * landl._{cd}$	1.902^{*}	1.337^{**}		1.330^{**}	2.362^{***}	1.236^{*}	1.849^{***}	1.756^{***}	1.347^{**}
	(1.151)	(0.604)		(0.632)	(0.636)	(0.732)	(0.616)	(0.543)	(0.667)
$lsubsoilintotalwealth_c$	0.245^{***}	-0.126^{***}		-0.124^{***}	-0.022	0.052^{*}	0.040^{**}	-0.117^{***}	-0.009
	(0.062)	(0.021)		(0.023)	(0.021)	(0.028)	(0.020)	(0.017)	(0.024)
$lsubsoilintotalwealth_d$	-0.104^{*}	-0.133^{***}		-0.158^{***}	-0.083^{***}	-0.256^{***}	-0.134^{***}	-0.061^{***}	-0.197^{***}
	(0.060)	(0.019)		(0.020)	(0.020)	(0.024)	(0.019)	(0.016)	(0.021)
Constant	-6.939^{***}	2.405^{***}		-0.128	3.182^{***}	0.126	5.460^{***}	0.085	2.912^{***}
	(2.381)	(0.808)		(0.863)	(0.837)	(1.049)	(0.792)	(0.689)	(0.898)
Observations	612	2217		2183	2303	2172	2466	2542	2201
R^2	0.19	0.46		0.42	0.48	0.47	0.48	0.50	0.46

Standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level. Variables are averaged over the period 1992-2007. Each column shows the results of a sector-level gravity estimation. The left-hand side variable $LogEXP_{icd}$ denotes the log of exports from country c to d relative to GDP in industry i. The geographical variables at the right-hand side include the log of bilateral distance between the two countries' major cities $ldist_{cd}$, the log of country c's population $lpop_c$, the log of its land area $larea_c$ and both variables for trade partner d, respectively. The dummy variable $landlocked_{cd}$ indicates whether none, one or both of the countries are landlocked by taking the value of zero, one or two. $border_{cd}$ is a common-border dummy. The following variables are interaction terms with $border_{cd}$. $lsubsoilintotalwealth$ is the log of subsoil wealth in total wealth for both the exporter and importer. [a] The plastic products sector (356) must be dropped due to inconsistencies in the matching of sector classifications ISIC Rev. 2 and 3 for sectoral GDP data.

Table 12

Gravity Approach
Sector-level Gravity Estimations, 1992-2007

	(28)	(29)	(30)	(31)	(32)	(33)
Sector (ISIC Rev. 2)	383	3832	384	3843	385	390
Dep. Var.	Log of bilateral exports to GDP $LogEXP_{icd}$					
$ldist_{cd}$	-1.557^{***}	-1.511^{***}	-1.232^{***}	-1.524^{***}	-1.252^{***}	-1.480^{***}
	(0.058)	(0.067)	(0.071)	(0.060)	(0.061)	(0.066)
$lpop_c$	0.188^{***}	-0.107^{**}	0.219^{***}	0.222^{***}	0.086^{*}	0.302^{***}
	(0.044)	(0.051)	(0.054)	(0.046)	(0.046)	(0.051)
$larea_c$	-0.165^{***}	-0.183^{***}	-0.266^{***}	-0.397^{***}	-0.073	-0.407^{***}
	(0.044)	(0.051)	(0.053)	(0.046)	(0.048)	(0.051)
$lpop_d$	0.848^{***}	0.688^{***}	0.720^{***}	0.477^{***}	0.792^{***}	0.668^{***}
	(0.042)	(0.049)	(0.052)	(0.044)	(0.044)	(0.049)
$larea_d$	0.091^{**}	0.211^{***}	0.147^{***}	0.258^{***}	0.158^{***}	0.235^{***}
	(0.040)	(0.047)	(0.050)	(0.042)	(0.042)	(0.046)
$landlocked_{cd}$	-1.182^{***}	-1.355^{***}	-0.653^{***}	-1.206^{***}	-1.101^{***}	-1.323^{***}
	(0.125)	(0.145)	(0.163)	(0.132)	(0.132)	(0.149)
$border_{cd}$	-4.490	-1.379	-0.373	-1.371	-2.089	-0.524
	(2.929)	(3.326)	(3.445)	(2.987)	(3.040)	(3.302)
$border_{cd} * ldist_{cd}$	0.810	0.890	0.136	-1.051^{*}	0.821	0.686
	(0.541)	(0.614)	(0.635)	(0.551)	(0.561)	(0.610)
$border_{cd} * pop_c$	-0.664^{*}	-0.385	-0.874^{**}	-0.898^{**}	-0.537	-0.409
	(0.365)	(0.414)	(0.429)	(0.372)	(0.379)	(0.411)
$border_{cd} * area_c$	0.199	-0.142	0.467	-0.009	0.041	-0.061
	(0.375)	(0.426)	(0.441)	(0.382)	(0.389)	(0.423)
$border_{cd} * pop_d$	-0.368	-0.072	0.235	-0.055	-0.294	-0.360
	(0.319)	(0.362)	(0.375)	(0.325)	(0.331)	(0.359)
$border_{cd} * area_d$	0.026	-0.053	-0.281	-0.103	-0.026	0.013
	(0.339)	(0.385)	(0.398)	(0.346)	(0.352)	(0.382)
$border_{cd} * landl._{cd}$	1.581^{***}	1.392^{**}	1.433^{**}	1.003	1.656^{***}	1.462^{**}
	(0.609)	(0.691)	(0.718)	(0.621)	(0.632)	(0.688)
$lsubsoilintotalwealth_c$	-0.198^{***}	0.068^{***}	0.047^{*}	-0.128^{***}	-0.068^{***}	-0.040^{*}
	(0.020)	(0.024)	(0.025)	(0.021)	(0.023)	(0.024)
$lsubsoilintotalwealth_d$	0.116^{***}	-0.189^{***}	-0.126^{***}	-0.161^{***}	-0.147^{***}	-0.214^{***}
	(0.019)	(0.022)	(0.023)	(0.019)	(0.019)	(0.021)
Constant	2.011^{**}	2.219^{**}	0.763	2.719^{***}	-1.717^{**}	2.707^{***}
	(0.789)	(0.920)	(0.959)	(0.822)	(0.855)	(0.909)
Observations	2437	2294	2207	2324	2371	2355
R^2	0.49	0.42	0.33	0.46	0.42	0.42

Standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% level. Variables are averaged over the period 1992-2007. Each column shows the results of a sector-level gravity estimation. The left-hand side variable $LogEXP_{icd}$ denotes the log of exports from country c to d relative to GDP in industry i. The geographical variables at the right-hand side include the log of bilateral distance between the two countries' major cities $ldist_{cd}$, the log of country c's population $lpop_c$, the log of its land area $larea_c$ and both variables for trade partner d, respectively. The dummy variable $landlocked_{cd}$ indicates whether none, one or both of the countries are landlocked by taking the value of zero, one or two. $border_{cd}$ is a common-border dummy. The following variables are interaction terms with $border_{cd}$. $lsubsoilintotalwealth$ is the log of subsoil wealth in total wealth for both the exporter and importer.

Table 13

List of Countries

Sample 1970-2007

Algeria	Egypt	Kenya	Rwanda
Argentina	El Salvador	Republic of Korea (IV)	Saudi Arabia
Australia (IV)	Ethiopia	Kuwait	Senegal
Austria (IV)	Finland (IV)	Madagascar	Sierra Leone
Bahrain	France (IV)	Malawi	Singapore
Bangladesh	Gabon	Malaysia	South Africa (IV)
Belgium and Lux. (IV)	Gambia	Mexico (IV)	Spain (IV)
Bolivia	Germany (IV)	Morocco	Sri Lanka
Brazil (IV)	Ghana	Nepal	Sudan
Burkina Faso	Greece (IV)	Netherlands (IV)	Sweden (IV)
Burundi	Guatemala	New Zealand	Switzerland and Liecht.
Cameroon	Haiti	Nicaragua[a]	Syria
Canada	Honduras	Niger	Thailand
Central African Rep.	Hungary	Nigeria	Togo
Chile	Iceland	Norway (IV)	Trinidad and Tob. (IV)
China[a]	India (IV)	Pakistan	Tunisia
China (Hongkong)	Indonesia	Panama	Turkey (IV)
Colombia	Iran (IV)	Papua New Guinea	United Kingdom (IV)
Congo	Ireland (IV)	Paraguay	United States
Costa Rica	Israel	Peru (IV)	Uganda
Côte d'Ivoire	Italy (IV)	Philippines	Uruguay
Denmark (IV)	Jamaica	Poland	Venezuela
Dominican Republic	Japan (IV)	Portugal (IV)	Zambia
Ecuador (IV)	Jordan	Romania (IV)	Zimbabwe[a]

Sample 1992-2007, Additional Countries

Albania	Estonia (IV)	Latvia	Russia (IV)
Armenia	Georgia (IV)	Lithuania	Slovakia
Bulgaria (IV)	Hungary (IV)	TFYR Macedonia	Slovenia
Czech Republic	Kazakhstan	Republic of Moldova	
Croatia	Kyrgyzstan	Mongolia	

The exact number of countries included in the regressions depends on the data available and may vary. (IV) indicates that the country is included in the instrumentation strategy, which focuses on the time period 1992-2007. [a] Not included in basic regressions with private credit to GDP.

Table 14

8 References

Acemoglu, Daron, Simon Johnson and James A. Robinson (2001). "The Colonial Origins of Comparative Development: An Empirical Investigation." *American Economic Review*, 91 (5): 1369-1401.

Agosin, Manuel R., Roberto Alvarez and Claudio Bravo-Ortega (2012). "Determinants of Export Concentration Around the World: 1962-2000." *World Economy*, 35 (3): 295-315.

Alexeev, Michael and Robert Conrad (2009). "The Elusive Curse of Oil." *Review of Economics and Statistics*, 91 (3): 586-598.

Almeida, Heitor and Daniel Wolfenzon (2005). "The Effect of External Finance on Equilibrium Allocation of Capital." *Journal of Financial Economics*, 75 (1): 133-164.

Anderson, James E. and Eric van Wincoop (2003). "Gravity with Gravitas: A Solution to the Border Puzzle." *American Economic Review*, 93 (1): 170-192.

Anderson, James E. and Eric van Wincoop (2004). "Trade Costs." *Journal of Economic Literature*, 42 (3): 691-751.

Arcand, Jean Louis, Enrico Berkes and Ugo Panizza (2011). "Too Much Finance?" Washington D.C.: International Monetary Fund, Working Paper.

Arellano, Manuel and Stephen Bond (1991). "Some Test of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations." *Review of Economic Studies*, 58 (2): 277-297.

Auty, Richard M. (1994). "Industrial Policy Reform in Six Large Newly Industrializing Countries: The Resource Curse Thesis." *World Development*, 22 (1): 11-26.

Beck, Thorsten (2002). "Financial Development and International Trade: Is There a Link?" *Journal of International Economics*, 57 (1): 107-131.

Beck, Thorsten (2011). "Finance and Oil: Is There a Resource Curse in Financial De-

velopment?" Tilburg: European Banking Center, Discussion Paper No. 2011/004.

Beck, Thorsten and Asli Demirgüç-Kunt (2009). "Financial Institutions and Markets Across Countries and over Time: Data and Analysis." Washington D.C.: World Bank, Policy Research Working Paper No. 4943.

Berglöf, Erik and Alexander Lehmann (2009). "Sustaining Russia's Growth: The Role of Financial Reform." *Journal of Comparative Economics*, 37 (2): 198-206.

Brunnschweiler, Christa N. (2008). "Cursing the Blessings? Natural Resource Abundance, Institutions, and Economic Growth." *World Development*, 36 (3): 399-419.

Corden, W. Max and J. Peter Neary (1982). "Booming Sector and De-Industrialisation in a Small Open Economy." *Economic Journal*, 92 (368): 825-848.

Do, Quy-Toan and Andrei A. Levchenko (2007). "Comparative Advantage, Demand for External Finance, and Financial Development." *Journal of Financial Economics*, 86 (3): 796-834.

Feenstra, Robert C., Robert E. Lipsey, Haiyan Deng, Alyson C. Ma and Hengyong Mo (2005). "World Trade Flows: 1962-2000." Cambridge: National Bureau of Economic Research, Working Paper No. 11040.

Frankel, Jeffrey A. and David Romer (1999). "Does Trade Cause Growth?" *American Economic Review*, 89 (3): 379-399.

Giovanni, Julian di and Andrei A. Levchenko (2009). "Trade Openness and Volatility." *Review of Economics and Statistics*, 91 (3): 558-585.

Guiso, Luigi, Paola Sapienza and Luigi Zingales (2004a). "Does Local Financial Development Matter?" *Quarterly Journal of Economics*, 119 (3): 929-969.

Guiso, Luigi, Paola Sapienza and Luigi Zingales (2004b). "The Role of Social Capital in Financial Development." *American Economic Review*, 94 (3): 526-556.

Guriev, Sergei, Alexander Plekhanov and Konstantin Sonin (2009). "Development Based on Commodity Revenues." London: European Bank for Reconstruction and Development (EBRD), Working Paper No. 108.

Gwartney, James, Robert Lawson and Joshua Hall (2012). *Economic Freedom of the World: 2012 Annual Report*, Vancouver: Fraser Institute.

Gylfason, Thorvaldur (2001). "Natural Resources, Education, and Economic Development." *European Economic Review*, 45 (4-6): 847-859.

Gylfason, Thorvaldur and Gylfi Zoega (2006). "Natural Resources and Economic Growth: The Role of Investment." *World Economy*, 29 (8): 1091-1115.

Head, Keith, Thierry Mayer and John Ries (2010). "The Erosion of Colonial Trade Linkages after Independence." *Journal of International Economics*, 81 (1): 1-14.

Heritage Foundation (2012). Property Rights Index. Washington D.C.: Heritage Foundation.

Heston, Alan, Robert Summers and Bettina Aten (2011). Penn World Table Version 7.0, Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania.

Hattendorff, Christian (2012). "Do Natural Resource Sectors Rely Less on External Finance than Manufacturing Sectors?" Berlin: Discussion Paper, School of Business & Economics: Economics, No. 2012/17.

Huang, Yongfu and Jonathan R.W. Temple (2005). "Does External Trade Promote Financial Development?" Bristol: University of Bristol, Discussion Paper.

Karl, Terry Lynn (1997). "The Perils of the Petro-State: Reflections on the Paradox of the Plenty." *Journal of International Affairs*, 53 (1): 31-48.

Kroszner, Randall S., Luc Laeven and Daniela Klingebiel (2007). "Banking Crises, Financial Dependence, and Growth." *Journal of Financial Economics*, 84 (1): 187-228.

Kurronen, Sanna (2012). "Financial Sector in Resource-dependent Economies." Helsinki: Bank of Finland Institute for Economies in Transition (BOFIT), Discussion Papers No. 2012/6.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer and Robert W. Vishny

(1998). "Law and Finance." *Journal of Political Economy*, 106 (6): 1113-1155.

Levine, Ross (2005). "Finance and Growth: Theory and Evidence." In: *Handbook of Economic Growth*, edited by Philippe Aghion and Steven Durlauf. Amsterdam: Elsevier Science, 865-934.

Levine, Ross and Sergio L. Schmukler (2006). "Internationalization and Stock Market Liquidity." *Review of Finance*, 10 (1): 153-187.

Marshall, Monty G., Keith Jaggers and Ted Robert Gurr (2011). *The Polity IV Project*, Vienna, VA: Center for Systemic Peace.

Mayer, Colin and Oren Sussman (2001). "The Assessment: Finance, Law, and Growth." *Oxford Review of Economic Policy*, 17 (4): 457-466.

Mehlum, Halvor, Karl Moene and Ragnar Torvik (2006). "Institutions and the Resource Curse." *Economic Journal*, 116 (508): 1-20.

Muendler, Marc-Andreas (2009). "Converter from SITC to ISIC." San Diego: Working Paper.

Nili, Masoud and Mahdi Rastad (2007). "Addressing the Growth Failures of the Oil Economies: The Role of Financial Development." *Quarterly Review of Economics and Finance*, 46 (5): 726-740.

Pagano, Marco, Otto Randl, Ailsa A. Röell and Josef Zechner (2001). "What Makes Stock Exchanges Succeed? Evidence from Cross-Listing Decisions." *European Economic Review*, 45 (4-6): 770-782.

Ploeg, Frederick van der (2010). "Natural Resources: Curse or Blessing." *Journal of Economic Literature*, 49 (2): 366-420.

Ploeg, Frederick van der and Steven Poelhekke (2010). "The Pungent Smell of 'Red Herrings': Subsoil Assets, Rents, Volatility and the Resource Curse." *Journal of Environmental Economics and Management*, 60 (1): 44-55.

Rajan, Raghuram G. and Luigi G. Zingales (1998). "Financial Dependence and Growth." *American Economic Review*, 88 (3): 559-586.

Rajan, Raghuram G. and Luigi G. Zingales (2003). "The Great Reversals: The Politics of Financial Development in the Twentieth Century." *Journal of Financial Economics*, 69 (1): 5-50.

Ross, Michael L. (2001). "Does Oil Hinder Democracy?" *World Politics*, 53 (3): 325-361.

Ross, Michael L. (2004). "What Do We Know About Resources and Civil War?" *Journal of Peace Research*, 41 (3): 337-356.

Sachs, Jeffrey D. and Andrew M. Warner (1995). "Natural Resource Abundance and Economic Growth." Cambridge: Harvard Institute for International Development, Development Discussion Paper No. 517a.

Sachs, Jeffrey D. and Andrew M. Warner (2001). "The Curse of Natural Resources." *European Economic Review*, 45 (4-6): 827-838.

Sala-i-Martin, Xavier and Arvind Subramanian (2003). "Addressing the Natural Resource Curse: An Illustration from Nigeria." Cambridge: National Bureau of Economic Research, Working Paper No. 9804.

Standard & Poor's (2011). Compustat North America Database. New York: Standard & Poor's. (Access: Collaborative Research Center 649 "Economic Risk," Humboldt-Universität zu Berlin.)

Stijns, Jean-Philippe (2003). "An Empirical Test of the Dutch Disease Hypothesis: Using a Gravity Model of Trade." Berkeley: University of California, Working Paper.

Svaleryd, Helena and Jonas Vlachos (2005). "Financial Markets, the Pattern of Industrial Specialization and Comparative Advantage: Evidence from OECD Countries." *European Economic Review*, 49 (1): 113-144.

Tornell, Aaron and Philip R. Lane (1999). "The Voracity Effect." *American Economic Review*, 89 (1): 22-46.

United Nations Industrial Development Organization (UNIDO) (2010). *World Statistics on Mining and Utilities*, Vienna: UNIDO.

United Nations Industrial Development Organization (UNIDO) (2012). INDSTAT4 Database. Vienna: UNIDO.

United Nations Statistics Division (2012). UN Comtrade Database. New York: United Nations.

Wijnbergen, Sweder van (1984). "The Dutch Disease: A Disease After All?" *Economic Journal*, 94 (373): 41-55.

World Bank (2006). *Where is the Wealth of Nations? Measuring Capital for the 21st Century*, Washington D.C.: World Bank.

World Bank (2012). World Bank Development Indicators. Washington D.C.: World Bank.

World Trade Organization (WTO) (2010). *World Trade Report 2010: Trade in Natural Resources*, Geneva: WTO.

Yuxiang, Karl and Zhongchang Chen (2011). "Resource Abundance and Financial Development: Evidence from China." *Resources Policy*, 36 (1): 72-79.

Diskussionsbeiträge - Fachbereich Wirtschaftswissenschaft - Freie Universität Berlin
Discussion Paper - School of Business and Economics - Freie Universität Berlin

2014 bereits erschienen:

2014/1 FOSSEN, Frank M.; Ronny FREIER und Thorsten MARTIN
Race to the debt trap? : Spatial econometric evidence on debt in German municipalities
Economics

2014/2 SCHREIBER, Sven
Anticipating business-cycle turning points in real time using density forescasts from a VAR
Economics

2014/3 FOSSEN, Frank M. und Daniela GLOCKER
Stated and revealed heterogeneous risk preferences in educational choice
Economics

2014/4 KNABE, Andreas, Ronnie SCHÖB und Marcel THUM
Der flächendeckende Mindestlohn
Economics

2014/5 QUINT, Dominic und Pau RABANAL
Monetary and Macroprudential Policy in an Estimated DSGE Model of the Euro Area
Economics

2014/6 HUGHES HALLETT, Andrew; Ansgar RANNENBERG und Sven Schreiber
New Keynesian versus old Keynesian government spending multipliers: a comment
Economics

2014/7 DOBUSCH, Leonhard
Digitale Zivilgesellschaft in Deutschland : Stand und Perspektiven 2014
Management

2014/8 BEZNOSKA, Martin
Estimating a Consumer Demand System of Energy, Mobility and Leisure : a Microdata Approach for Germany
Economics

2014/9 GÖRLITZ, Katja und Sylvi RZEPKA
Does Regional Training Supply Determine Employees' Training Participation?
Economics

2014/10 BRANDSTETTER, Laura
Do Corporate Tax Cuts Reduce International Profit Shifting?
FACTS

2014/11 HETSCHKO, Clemens; Andreas KNABE und Ronnie SCHÖB
Looking Back in Anger? Retirement and Unemployment Scarring
Economics

2014/12 HEIMSTÄDT, Maximilian; Frederic SAUNDERSON und Tom HEATH
Conceptualizing Open Data Ecosystems: a timeline analysis of Open Data development in the UK
Management

2014/13 QUINT, Dominic
Is it Really More Dispersed?: Measuring and Comparing the Stress from the Common Monetary Policy in the Euro Area
Economics

2014/14 SCHREYÖGG, Georg und Simone M. OSTERMANN
Managing uncertainty in Intensive Care Units: Exploring formal and informal coping practices in a university hospital
Management

2014/15 LÜTHEN, Holger
Rates of Return and Early Retirement Disincentives: Evidence from a German Pension Reform
Economics

2014/16 MEISSNER, Thomas und Davud ROSTAM-AFSCHAR
Do Tax Cuts Increase Consumption? An Experimental Test of Ricardian Equivalence
Economics

2014/17 EICHFELDER, Sebastian und Mona LAU
Capital Gains Taces and Asset Prices: The Impact of Tax Awareness and Procrastination
FACTS

2014/18 BLAUFUS, Kay; Matthias BRAUNE; Jochen HUNDSDOERFER und Martin JACOB
Self-Serving Bias and Tax Morale
FACTS

2014/19 AMBROSIUS, Christian und Alfredo Cuecuecha
Do Remittances Increase Borrowing?
Economics

2014/20 EVERS, Andrea und Jochen Hundsdoerfer
Country-by-Country Reporting: Eine neue Rechnungslegung über länderspezifische Wertschöpfung und Ertragsteuern?
FACTS

2014/21 BÖNKE, Timm und Guido NEIDHÖFER
Parental background matters: Intergenerational mobility and assimilation of Italian immigrants in Germany
Economics

2014/22 JURKATIS, Simon und Wolfgang STREHL
Gini decompositions and Gini elasticities : on measuring the importance of income sources and population subgroups for income inequality
Economics

2014/23 BINDER, Michael und Christian J. OFFERMANNS
International Investment Positions and Exchange Rate Dynamics
Economics

2014/24 BINDER, Michael und Christian J. OFFERMANNS
Globalization and International Business Cycle Dynamics: a Conditional GVAR Approach
Economics

2014/25 OFFERMANNS, Christian J.
On the Degree of Homogeneity in Dynamic Heterogeneous Panel Data Models
Economics

2014/26 HETSCHKO, Clemens
On the Misery of Losing Self-employment
Economics

2014/27 CORNEO, Giacomo
Kapitalsteuern und öffentliches Eigentum: Anmerkungen zum optimalen Umgang mit einer hohen Vermögenskonzentration
Economics

2014/28 FOSSEN, Frank und Viktor Steiner
The Tax-rate Elasticity of Local Business Profits
Economics

2014/29 BESTER, Helmut und Matthias Dahm
Credence Goods, Costly Diagnosis, and Subjective Evaluation
Economics

2014/30 CORNEO, Giacomo
Income inequality from a lifetime perspective
Economics

2014/31 NACHTIGALL, Daniel und Dirk RÜBBELKE
The Green Paradox and Learning-by-Doing in the Renewable Energy Sector
Economics

2014/32 BARTELS, Charlotte und Katharina JENDERNY
The Role of Capital Income for Top Incomes Shares in Germany
Economics