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Declaration

I declare that this disseration has been composed solely by myself and that it has not been submitted, in whole or in part, in any previous application for a degree. Except where states otherwise by reference or acknowledgement, the work presented is entirely my own.

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INTRODUCTION

There was a time when Germany was once called as "Sick man of Europe"[1]. When Gerhard Schröder steps into his new office in the Bundestag on March 14th 2003, more than 4 million Germans, 11.6 percent of the workforce, were living on unemployment benefit. A widespread assumption was that unemployment could never be defeated, merely "administered" says Wolfgang Clement, who was the former chancellor's labor and economics minister[2]. Counting that spirit, it was Mr. Schröder who unveiled a package of reforms that he called *Agenda 2010*. It soon became clear that the agenda would transform Germany's labor market substantially.

The aim of the reform was to make Germany's labor market active and flexible. In the labor market, Mr.Schröder made firing employees easier with the expectation that it will be linked to easier hiring as well. Rules protecting employees against dismissals "for economic reasons" were loosened. Also, measures were introduced to help employers avoid lawsuits from laid-off workers seeking re-employment. Above all, it merged two types benefits : Federal assistance for the unemployed (Unemployment Assistance) and Municipal welfare payment (Social Assistance), into one basic living standard called "*Hartz IV*", named after Peter Hartz who proposed it.

After 10 years since that reform, in spite of the 2008 financial crisis, Germany stands as an economic powerhouse, with record high employment and the lowest youth unemployment in Europe. With the fourth-largest GDP in the world after United States, China, and Japan, Germany transformed itself to an "economic superstar" in less than a decade[3]. Of course, the strong German economy is not solely attributed to the reform. Restrained growth in wages and healthy demand for exports were at least as important. However, Germany would be foolish to ignore its real achievement and an important lesson from this significant change.

Of course, it did not come without a price. As much of Europe looks to Germany for lessons on how to revive moribund labor markets, the proliferation of low-wage jobs has sparked a vigorous

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[1] "The Sick Man of the Euro." The Economist. The Economist Newspaper, 03 June 1999.
[2] "Wunderreform." The Economist. The Economist Newspaper, 16 Mar. 2013.
[3] Dustmann *et al*, 2014

debate on whether enough workers are sharing in the nation's strong economic performance. It is undeniable when we look to the data. Labor office data shows that the low wage sector grew three times as fast as other employment in the five years to 2010, explaining why the 'job miracle' has not prompted Germans to spend much more than they have in the past[4]. Germany's Federal Employment Agency says the number of temporary jobs has doubled over the past ten years. The agency reports that half of the temporary work contracts end after less than three months, and the wages earned are considerably below what full-time employees earn in the same companies. In a sign that inequality is increasing, a 2013 study by the Macroeconomic Policy Institute in Düsseldorf reported that the *GINI* coefficient in Germany rose by nearly 13 percent from 1991 to 2010.

Certainly, the economic fruits of Germany for last 10 years were not equally enjoyed by everyone. Rather, new economic environment with a less secure social system made the lives of people undergoing hardship more vulnerable. First, people who were in the atypical workforce and lived on social benefits faced a direct cut-down of the amount of benefits they used to expect. Mini-jobs became a trap for people who failed to climb the secure job-ladder in the first place and the macroeconomic environment was not favorable to them either. Economic crisis in 2008 followed soon after this rapid reform. Although Germany receives praise for overcoming the financial crisis and is amongst the most successful developed countries, the economic crisis did widen the gap between the rich and the poor in Germany[5]. My initial interest started from those people who were left behind amid these rapid economic changes in Germany. How did that change steer citizen's life and how were their lives affected? Questions were narrowed down to three representative groups in this thesis: *Low-paid workers*, *Immigrants* and *The Young*.

Chapter 1 examines the last series of the Hartz reform, Hartz IV, and verifies how people in the labor market react to this new system by analyzing changes in household savings. Notably, this new system was the highlight of Hartz reform in 2005 following Agenda 2010 and remarkably reduced the amount of social benefit that people in need could expect in case of hardship. Because of its radical change, it encountered strong resistance from people who were relying

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[4] There are critics that low-wage jobs rose mainly in the years before Agenda 2010 and have stayed constant since. Although the number of part-time jobs has grown, many of the people who have them in fact want them, so that they can, for example, care for children as well. (Michael Huther, director of the Cologne Institute for Economic Research, an employer-financed think-tank.) http://www.economist.com/news/europe/21573583-ten-years-how-does-germanys-agenda-2010-package-rate-wunderreform

[5] According to a report by the Organization for Economic Cooperation and Development (OECD), from the beginning of the economic crisis in 2008 to 2011, the incomes of the rich grew while the wages of the boom 10 percent of earners stagnated. OECD. (2015), In It Together: Why Less Inequality Benefits All, OECD Publishing, Paris. DOI: http://dx.doi.org/10.1787/9789264235120-en

on benefits and changed the way German society perceives social security. With respect to this new scheme, how would people financially prepare themselves? By estimating the extent of preparation measured by the household saving rate, Chapter 1 attempts to answer this question.

Chapter 2 examines whether immigrants have a higher tendency of benefit take-up compared with their native counterpart. Immigrants account for about 10 percent of the German population, and it reaches around 20 percent when people with immigration background are included. An alarmingly high percentage of immigrants live in a parallel world with poor prospects of a decent education and career advancement. According to the analysis by OECD[6], the unemployment rate of immigrants is above 14 percent in Germany, which is more than twice the level observed for the native-born population. And even among the employed, immigrants have poor earnings performance relative to natives. This sluggish economic status is highly linked to their higher dependency on government benefits. Chapter 2 aims to verify this relationship, using data and estimation models. Considering the refugee crisis[7], public opinion on immigrants is becoming harsher due to the view that they are coming to Germany with the aim to receive generous social benefits from the German government. In light of the heated dispute over this topic in this time, it will be meaningful to elucidate on the welfare take-up behavior of immigrants. Although immigrants in this analysis mostly entered Germany during 1970s-1990s, I expect this study can influence future policy.

Chapter 3 moves its focus to young people and verifies how housing price after 2007 affects move-out behavior of young Germans from the parental home. It is widely known nowadays that young people, referred to as "*Millennials*[8]" are suffering from financial concern much more than their previous generations. They tend to achieve their economic independence much later than earlier generations did, and that fact leads them to decisions over lifetime events such as moving out from the parental home, marriage, and childbirth for example. Concerning this issue, Chapter 3 notes the fact that housing market in Germany was substantially increased last decade. Although the rate of growth in house price is less steep compared to those in other developed countries, it was quite striking for Germans who have been accustomed to stable housing prices for decades. And of course, young people are the most vulnerable age group

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[6] OECD factbook 2010: Economic, Environmental and Social Statistics. Migration and unemployment

[7] The European migrant crisis outbreak in 2015, when a rising number of refugees and migrants crossed into the European Union (EU) to seek asylum, traveling across the Mediterranean Sea or through Southeast Europe. The crisis is mainly driven by the continuing conflict in Syria along with the ongoing violence in Afghanistan, Iraq, Eritrea, Kosovo, etc. Germany has been the most sought-after nal destination in the EU migrant and refugee crisis.

[8] According to Wikipedia 'Millennial', this generation is the demographic cohort following Generation X, without precise dates for when it starts and ends. Usually, this term is applied to individuals who reached adulthood around the turn of the 21st century.

with respect to this change. What effect do housing costs have on young Germans wanting to set up a household? To what extent are housing costs important for young people in Germany? Chapter 3 navigates throughout these questions.

The abovementioned research questions are summarized as below.

- Chapter 1: Did the Hartz IV reform affect household savings in Germany?

- Chapter 2: Are immigrants more likely to take up Hartz IV benefit than natives?

- Chapter 3: Do higher housing costs deter the young from moving out from their parental home?

1. THE EFFECTS OF THE HARTZ IV REFORM ON PRECAUTIONARY SAVINGS

ABSTRACT

Using the reform on unemployment benefit II in 2005 within Germany this paper verifies precautionary saving motives of German households. Based on results from first difference regression and a random effects Tobit model using two years of GSOEP panel data, this paper finds that an increase of benefits by one unit (1,000 Euros) decreases household's saving rate in a range from 1.2 to 2 percent point depending on applied specifications. Though the magnitude of calculated results is quite moderate compared to the results from prior research, it is consistently found that there is a negative relationship between the amount of benefits, which is derived from simulation, and the household saving rate. This paper takes this result as an evidence that there exists a moderate precautionary motive in savings for German households. It gives an important policy implication: Unfavorable benefit cuts make households take more financial responsibility concerning income uncertainty.

1.1 Introduction

The decision on how much to save against income uncertainty is probably one of the most important economic decisions households have to make. According to analysis with *SAVE* data[1] on German population, it was found that saving for an unforeseen event is the most important savings motive for German household heads[2], together with the old-age provision purpose. This saving, which occurs in response to uncertainty regarding future income, is the definition of precautionary savings that various studies have attempted to verify, including this paper.

The presence of precautionary saving motive and its importance has been shown through many researches theoretically so far. Carroll (1992) and Carroll, Dynan and Krame (1999), argued in their research that saving for precautionary purposes is an important driving force in a consumption-led business cycle. A result of simulations from Hubbard, Skinner and Zeldes(1994) also suggests that precautionary savings could account for almost half of the aggregate capital stock in U.S.

Whereas findings from simulation studies have consistently emphasized on the role of precautionary savings, the results based on empirical works are not clear-cut. Depending on data and estimation models, the precautionary motive in savings behavior varies from 'significantly important' to 'minor effects' or 'none'. The biggest reason for these mixed findings is due to various and different measures of income uncertainty. Depending on how to gauge this income uncertainty in empirical works, findings from studies vary widely.

As one way of measuring income uncertainty, income variation was widely used especially by Carroll and Samwick (1997,1998) and Kazarosian (1997). Using the United States panel data, they found a strong precautionary saving motive under the premise that if the stock of wealth is positively related to income variations it can be interpreted as the evidence for the existence of precautionary savings. According to their estimation, 30-46 percent of total wealth accumulation of U.S. households can be explained as precautionary savings.

One of the alternative methods of measuring income uncertainty is a subjective risk variable. Lusardi (1997, 1998), for example, stressed the importance of precautionary savings using a subjective risk measure which is generated from the *University of Michigan Health and Retirement Survey*. In Lusardi (1997), she addressed that precautionary motives for savings exist but also added it is difficult to detect them, using subjective variables about earning variance

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[1] Information about the SAVE survey and how to download the data is available at www.mea.uni-mannheim.de
[2] Michael Ziegelmeyer(2009)

provided by the *Italian Survey of Household Income and Wealth data.* Income variation and subjective measures introduced so far are classified as a direct measure of income uncertainty in a sense that they try to gauge income uncertainty without any proxies.

On the other hand, income uncertainty can be measured indirectly by adopting a proxy which is closely linked to income uncertainty such as consumer's occupation, education, employment sector and institutional changes. These indirect measures are useful when it is not feasible to employ a direct measure of income uncertainty or when there are available proxies which can identify income uncertainty effectively.

Skinner (1988), for example, tried to determine the presence of precautionary savings using U.S. data based on the assumption that some occupations such as the self-employed or crafts men are facing higher income risks than other occupations. He confirmed the role of precautionary savings from the result that people in riskier occupations save less than those in other occupations. Nicola Fuchs-Schündeln and Matthias Schündeln (2002) also used occupation groups as a proxy of income uncertainty. They noted civil servants mainly because civil servants have a significantly lower income risk than the other occupations do. After having controlled self-selection of risk averters into low-risk occupations, they found that precautionary wealth explains up to 25 percent of total wealth for German households.

As another example of the indirect measure of income uncertainty, Engen and Gruber (2001) used "institutional change" as a proxy of income uncertainty. Using differences in the state-contingent income stream which is available to workers through the unemployment insurance program, they found there is a strong precautionary savings motive for U.S. households. Based on simulation, they found that the unemployment insurance in the U.S. has a crowd-out effect on private savings, and the effect decreases as income uncertainty increases. In conclusion, they revealed that reducing the income replacement rate of unemployment insurance by 50 percent can increase gross asset holdings by 14 percent.

This paper is in line with a study of Engen and Gruber (2001) in as much as it uses an institutional change, a reform on unemployment benefit system in 2005 in Germany, as a proxy of income uncertainty. Unlike the case of Engen and Gruber (2001), the unemployment benefit system in Germany is not differentiated by the state. Instead, Hartz IV reform in 2005 in Germany provides a tool to examine how Germans respond to the changes in unemployment benefits newly generated by the reform. Thus, timewise differences of the amount of benefits before and after reform will be used as a proxy of income uncertainty in this paper.

Hartz IV reform in 2005 has advantages as a measure of income uncertainty because firstly, it

was an exogenous and independent change, and secondly, it applied to the entire population. Therefore using this reform in the analysis is free from a self-selection issue which previous studies had to address when they adopt a policy change as a measure. This reform was controversial even before its enforcement due to the magnitude of changes it was supposed to bring in. It was designed to reduce the amount of unemployment benefit by a large amount, and boost incentives to work for people who live on benefits. As most of the households faced the reduced amount of benefits by the reform when other conditions in households remain unchanged, it is expected that people who are affected by the reform encounter larger income variances when they are unemployed. Thus, this paper attempts to examine how households adjust their savings in response to a reduced back-up financial source, assuming the extent of the response provides clues about precautionary savings of German households.

As the main specification, this paper adopts a first difference model to eliminate unobserved time invariant factors within a model. Additionally, Tobit estimation follows to deal with censored savings data. Application of estimation will be presented in section 3 with data introduction. In section 4, various robustness checks follow to reassure results of main estimations. In section 5, this paper concludes that the reform in 2005 did increase the saving rate of households, and the size of its effect is not trivial. The next section begins with an introduction of the unemployment benefit system in Germany bracketing the time when this reform was brought in.

1.2   Institutional Background

The unemployment benefit system in Germany had been changed and revised continuously in the past by way of activating labor market and reducing the moral hazard of the unemployed. This paper covers the most recent reform of Hartz IV, enacted in 2005 and 2006 especially, which is the last series of Hartz reforms (I-IV). The Hartz reform was introduced in 2002 and subsequently implemented during the time period 2002-2005. Aiming at 1) improving labor market services and policy measures in terms of effectiveness and efficiency, 2) activating the unemployed by enforcing the so-called principle of rights and duties and 3) fostering employment demand by deregulating the labor market[3], it consists of four different reforms on labor market from Hartz I to Hartz IV.

The first and second reform of this package, Hartz I and II came into effect in 2003. As a system-

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[3] Jacobi and Kluve (2006)

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atic help for the unemployed, it founded "Staff service agency (Personal-Service-Agenturen or *PSAs*)" and supported further vocational education. Mini-jobs and Midi-jobs with lower taxes and insurance payment were created and grants for entrepreneurs was introduced called as "*Ich-AG (Me, Inc.)*" aiming at making new types of jobs easier to create. Hartz III reform came into force in 2004 and aimed to restructure and reform the job-center.

The fourth stage of reform was in effect as of 2005 and is considered as a paradigm shift in German labor market in a sense that it changed the way that German society deals with social security and people living on it. Simplifying previous unemployment benefit system, it reduced the benefit amount the unemployed expect to receive when other conditions remain unchanged in the household, and also tightened the means-test and penalty rules.

Unemployment Benefit (UB/UB I) Before and After Reform

Until 2004, there were three pronged unemployment benefit systems which consist of unemployment benefit, unemployment assistance, and social assistance[4]. Unemployment benefit (UB) was a part of a compulsory form of insurance financed by contributions. Thus unemployment benefits were paid without any means-testing. To be eligible for UB, people had to be registered as the unemployed in local labor office and not older than 65 years old. And they had to have worked for at least 12 months in the last three years and to be eligible for the maximum entitlement period they had to have worked a certain number of months in the last seven years. The maximum duration of benefits varied between 6 and 32 months depending on age and contribution periods. The amount of benefit for the unemployed is 67 percent of previous net earnings if he/she has at least one dependent child and 60 percent if they have no child. This replacement rate of previous earnings was not changed by the reform in 2006.

Although the replacement rate remained the same after the reform, eligibility criteria became stricter, and the maximum duration was reduced. Now, to become eligible for UB, claimants have to have worked at least 12 months in the last two years, and they should have worked in the previous three years to be entitled to the benefit for the maximum periods. Furthermore, people who are older than 55 years old can claim UB for more than 12 months, and maximally it can be extended only to 18 months, being reduced from 32 months in the previous system.

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[4] Throughout this paper, the term indicating benefit system will be denoted with its abbreviation. Before reform: UB (Unemployment benefit, *Arbeitslogengeld*), UA (Unemployment assistance, *Arbeitslogenhilfe*), SA(Social assistance, *Sozialhilfe*) After reform: UB I (Unemployment benefit, *Arbeitslogengeld I*), UB II (Unemployment benefit II, *Arbeitslogengeld II* -which gains its new name from the reform Hartz IV)

Unemployment Benefit II (UA/UB II) Before and After Reform

Changes in Unemployment assistance (UA) and Social assistance (SA) are more progressive than those in Unemployment Benefit I. Before reform, UA and SA worked separately and UA benefits were prioritized over SA. People could be eligible for UA either after their eligible duration of UB has expired or when they are not eligible for UB in the first place due to their lack of contributions. The benefit of recipients amounted to 57 or 53 percent of their previous income depending on whether recipients have children or not, respectively.

The UA system had faced a lot of criticism before the reform because this benefit was fairly generous given that it is a second method for people in the long-term unemployment and financed by tax regardless of the contribution of recipients. Moreover, almost unlimited duration of this benefit was a controversial issue as well. In principal, it was not time-limited but initially granted for a year and then prolonged every year if another means-test was passed and the claimant was younger than 65 years old[5]. Jacobi and Kluve (2006) argued in their paper that the unlimited duration of unemployment benefit payment (UA) was an extraordinary feature of the German unemployment benefits system with the highest income replacement rate for long-term unemployed among any other OECD country (OECD 2004) whereas the replacement rate of the short-term unemployed (UB) is at a moderate level.

Moreover, when an individual's calculated UA was below their social minimum due to their low previous earnings, it was also possible to claim SA simultaneously to fill the gap[6]. Social assistance (SA) was a system which is basically paid for people who cannot finance themselves and who have no other benefit or income to meet his or her basic needs. This minimum amount is calculated on the basis of a basic subsistence level, housing costs and heating, irregular payment and certain benefit in kind. Because the certain amount of SA was always guaranteed for people who are eligible for UA, the UA system was widely perceived as being too generous as a "social benefit" rather than "unemployment" benefits.

Accounting for this issue, in January 2005, UA and SA were combined in one system as so-called '*Unemployment benefits II* (UB II)'. Now, UB II is provided to people who are in need and able to work but who cannot claim UB I. Those who are unable to work due to disability or

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[5] Schmitz and Steiner (2007)

[6] People who are eligible for UA but its amount is below a social minimum could claim the differences to local authority as UA was managed by federal labor department. Thus, there were people actually only receive amount less than a social minimum in practice as they did not claim their additional benefits to local government. In research done by Bruckmeier and Wiemers (2011), they claimed that almost 40 percent of the recipients of UA would have potential income gains through the implementation of the new eligibility conditions (new reform) because of the reason above.

Tab. 1.1: Unemployment Benefit System Before and After Hartz IV Reform

	Before Reform		After Reform
UB	Insurance oriented Funded by contribution Earning related (67% of net earnings for people who have at least one child, 60% for people who have no child) Limited duration	UB I	Effective since 2006 Funded by contribution Earnings related (Replacement not changed) Maximum benefit duration reduced for people whose age is over 55 years old
UA	Tax funded, means-tested Earnings related (57% for people with children, 53% for people without children)	UB II	Tax funded and means-tested Formal UA and SA were merged to UB2 which is newly designed for people who are capable of working
SA	For income below subsistence level Tax funded, means tested, flat rate and infinite duration		

disease can claim social assistance instead, but the unemployed do not fall into social assistance category any longer because they are able to work by definition[7]. For an overview of the benefit system before and after reform, see Table 1.1[8] [9].

As Table 1.1 shows, the amount of UB II benefit is now reduced to a social minimum of households, not varying with previous earnings. The calculation of a social minimum is more or less same as that of social assistance before reform, which is a sum of the standard rate of each household member, housing and heating costs. Although the standard rate of social assistance (295 Euros per month on average in 2004) is slightly less than the new standard rate under the new system (around 340 Euros per month in 2005), the actual amount of benefits hardly changed in practice because of a one-time benefit from social assistance. The one-time benefit was provided to claimants to cover atypical needs of a household before reform, and it was ascribed to a new benefit system[10] by adding the mean of the one-time benefits to the lump sum payment. Thus, it is reasonable to assume the equivalence of the standard rate between before and after reform.

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[7] The eligibility for UA depended on a workers employment history. However, SA before reform was the basic safety net for all households in need regardless of their employability. UB2-Hartz IV benefit is targeted at employable persons. A household in need and not employable are applied to social assistance (in SGB XII). As only employable persons are in our concerns for research, social assistance after reform was not considered.

[8] Bernhard Ebbinghaus and Werner Eichhorst (2006)

[9] From below, each benefit will be denoted as UB, UA, SA under the old system and UB1, UB2, SA under the new system for simplicity.

[10] Bruckmeier and Wieners (2011)

Tab. 1.2: Unemployment Benefit II: Lump sum Standard Payment (SP)

	Single or Single parent	Other Household Members		
		Children up to 14 years old	Children aged between 15 and 18	Adults, 19 yrs of age and above)
	100% SP	60% SP	80% SP	90% SP
Western Germany including Berlin	EUR 345	EUR 207	EUR 276	EUR 311
Eastern Germany	EUR 331	EUR 199	EUR 265	EUR 298

Additionally per household:
- Transfer for lodging and heating
- (If the preconditions are fulfilled), a limited additional payment of up to EUR 160 for gainfully employd individuals and for their partners and up to EUR 60 for each child
- Contributions to compulsory social insurance (health, nursing care and old age)

Source: *Bundesministerium fur Wirtschaft und Arbeit* (2004)

Table 1.2 [11][12]describes the initial structure of new benefit system. The standard payment in Western Germany is slightly higher than Eastern peers, and household members are expected to claim a different value of the standard payment depending on their age. In addition to these lump sum transfers, the actual costs for lodging and heating are provided if deemed appropriate, as well as compulsory social insurance contributions and payments for special needs. The standard payment of UB II in this table has been continuously and gradually increased since its introduction[13] and the gap in benefits between West and East was eliminated in 2006.

Overall, people who have been entitled to UA under the old system can claim only the benefit which is now decreased by the reform[14]. When other conditions such as household composition, the region they live in and volume of assets remain unchanged, the simple calculation from the table illustrates that they will receive the decreased amount of benefits from then on. According to the simulation studies by Schulte (2004), Blos and Rudolph (2005) and Becker and Hauser (2006) on the effects of Hartz IV reform, more than 60 percent of former UA recipients faced

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[11] Wolfgang Ochel (2005)

[12] But since 1 January 2012, the standard payment is EUR 374 for all of Germany. The normal requirement for adult partners is EUR 337. Children younger than 6 years receive EUR 219. Between 6 and including 13 years of age this is EUR 251. Children and young person between 14 and 17 years receive EUR 287. For young adults from 15 years on and below the age of 25 who live with their parents or who moved without the positive assertion of the municipal authority, this is EUR 299. (www.arbeitsagentur.de)

[13] The standard rate of a single adult is 347 Euros in 2007, 351 Euros in 2008 and 359 Euros in 2010.

[14] The amount of UA was on average EUR 550 in 2003 in Western Germany.

income losses or even lost their entitlements, while benefit level of former SA recipients was not affected.

In the following section, I show the simulation process by calculating "the expected amount of benefits" that people expect to receive when they are unemployed and estimate how this change in benefit amounts induced by the reform affects the saving behavior of households. More details on how this benefit is calculated in practice will be described in the next section.

Due to the fact that UA/UB II system is not the first welfare program that people could apply for, some might argue that there would be little or no impact of this reform on most of the people. However, this paper emphasizes the role of this UA/UB II program for the majority of households with following reasons. Firstly, many of the unemployed are not eligible for UB I in the first place. According to the calculation from Schmitz and Steiner (2007), more than 30 percent before reform and over 35 percent after reform of unemployed people were not eligible for UB I. Secondly, the average duration of use of UB/UBI is short, and it even gets further shortened by the reform. From the same research by Schmitz and Steiner (2007), it was also found that among the people who were eligible for UB I, fifty percent were eligible only for 1-12 months. In addition, the average entitlement duration of UB I for unemployed people only amounts to 6-7 months, which makes UB II system more important to people in need. As the maximum duration of entitlement becomes shortened by reform in 2006, it strengthens the conjecture that changes of UA benefit system could be influential for households in general.

1.2.1   Data and Specification

Base model

To figure out how the reform and changes in the amount of benefit affected the saving behavior of households, a first difference model is adopted as shown in equation (1.1). Using two years of panel data, this model uses differences between values across time of the observed variables as the variables in the regression. Data from 2002 and 2007 are chosen here, as these are the only years that detailed assets and wealth information of households are surveyed[15], essential to define an eligibility status and to calculate the expected amount of benefits.

$$\Delta S_{it} = \Delta X'_{it}\delta + \Delta B_{it}\gamma + \Delta e_{it} \quad (t = 0, 1) \tag{1.1}$$

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[15] The survey of asset and wealth is conducted every four years in SOEP

S_{it} is a saving rate calculated by dividing monthly household savings by household monthly income. The saving rate was preferred over the saving scale here because the underlying role of precautionary savings is to maintain a certain living standard of households. As monthly saving rate can be defined as a portion of income that people put aside every month, the saving rate seems more reliable in this context. Only household heads were used in the analysis, as savings and household income were collected at household level in SOEP data. To examine the saving response of working population to unemployment benefit (UB II) reform, only employed people are taken into account. Using two years of panel data, $t = 0$ and $t = 1$ indicates the year 2002 and 2007 which accords with before and after reform respectively. The continuous variable B_{it} represents the expected amount of benefits of individual i at time t. The benefit amount that each individual expects to receive before and after reform will be calculated based on policy description in the next section. The error term e_{it} is a assumed as a random.

The coefficient γ is our main interest. It indicates the effects of benefit amount on the saving rates and can be interpreted as the evidence of the presence of precautionary savings when it shows a negative value. According to the expression in Gruber's paper (2001), this negative effect of welfare benefit on private savings can be regarded as "a crowd-out effect" in a sense that generous publicly-financed benefit leads people to reduce their own financial preparation for uncertainty, thereby decreasing private savings. In this case, it is expected that the decrease in the amount of benefit could stimulate households to increase the portion of household savings to their monthly income because Hartz reform reduced the expected amount of benefit for people in general, assuming that other household characteristics remain unchanged.

X_{it} is the set of exogenous control variables used in the basic specification, including age, sex, marital status, regional dummies, asset level (the amount of asset), the number of children, race, and years in education of the individuals. By controlling these factors, it is expected to exclude the influence of other factors on changes in the amount of benefit and γ can identify the pure effect of changes in the amount of benfit on saving behaviors of households.

The most advantageous part of using the first difference model is that we can expect consistent estimators even though there is a potential problem arising from the case either $Cov(X_{it}, \alpha_i) \neq 0$ or $Cov(e_{it}, \alpha_i) \neq 0$, as long as time-invariant (α_i) assumption holds. The fact that the first difference model can address the problem of omitted and unobservable factor in the model is especially advantageous in the context of precautionary savings. Due to the individual specific saving preferences or risk aversion which is not observable in the data, controlling these factors in a model was a crucial issue in previous literature. Previous works by Nicola Fuchs-Schündeln, Matthias Fuchs-Schündeln (2002) and Lusardi (1997) argued that precautionary

savings can be underestimated when risk aversion is not properly controlled in the estimation. Assuming that those unobservable factors are time invariant, this problem could be addressed[16].

Extension: Tobit Estimation

The specification in (1.1), however, faces a critical problem because of censored data. In the final sample generated from SOEP, it is found that around thirty-eight percent of saving data is missing. This is mainly because respondents participating in the survey do not report negative savings. Without taking these into account, the result of estimation (1.1) is likely to underestimate the effect of changes in benefits. To address the problem of biased estimates due to the censored dependent variable, a random-effects Tobit model[17] is applied as an extension to equation (1.1) in equation (1.2) below.

$$S_{it}^* = \mu + a_i + B_{it}\gamma + X_{it}'\delta + e_{it} \quad (t = 0, 1) \tag{1.2}$$

S_{it}^* is a latent variable which linearly depends on B_{it} and X_{it} via a parameter which determines the relationship between the independent and the latent variable. S_{it}^* is not observable in a data and observed S_{it} in equation (1.1) represents possibly censored versions of S_{it}^*. In our left-censored case, S_{it}^* is smaller than S_{it}, because negative savings are not observed in a data. Indications of all coefficients remain the same as those in equation (1.1), except that the random effect a_i is added in the model. The random effect a_i and error term e_{it} is assumed to be independent and identically distributed according to $N(0, \sigma_a^2)$ and $N(0, \sigma_e^2)$ respectively. Again, if γ gives a negative sign, then it is interpreted that precautionary savings are present.

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[16] In empirical research using SOEP data, a new measure of individual risk preference has been used since 2004. This survey questions contain a variety of different approaches to measuring risk attitudes. As a subjective evaluation on their risk taking attitude, one survey question asks "How willing are you to take risks in general?" Then respondents rate their willingness on taking a risk on each matter-such as health, finance so on - with a score range from 0 to 10. Though this variable can be considered as an alternative control, however, given that this survey is included in SOEP questionnaire in every 4 years, I stick to the previous assumption that preference for risk of individuals is a time-invariant variable.

[17] Currently, there is no command in STATA for a parametric conditional fixed effects model, as there does not exist a sufficient statistic allowing the fixed effects to be conditioned out of the likelihood. Honore' (1992) has developed a semi-parametric estimator for fixed-effect Tobit models. Unconditional fixed-effects Tobit models may be fitted with the tobit command with indicator variables for the panels; the indicators can be created with the factor-variable syntax described in [U] 11.4.3 Factor variables. However, unconditional fixed-effects estimates are biased. See http://www.stata.com/manuals13/xtxttobit.pdf

Data

The German Socio-Economic Panel (GSOEP) is a longitudinal survey of approximately 11,000 private households in the federal republic of Germany from 1984 to 2012, and Eastern German Länder from 1990 to 2012, produced by DIW Berlin[18]. Variables in GOSEP include household composition, employment, occupations, earnings, health and satisfaction indicators[19].

Despite SOEP data has been widely used since mid-1980, availability on private wealth was limited due to lack of consistent and complete micro data. To address this limitation, the 2002 and 2007 GSOEP panel collected information about private household wealth, providing new insights into this important issue. As information about asset and wealth is essential here to decide the eligibility of recipients in simulation later on and also important as a control variable, I took 2002 and 2007 waves in the main analysis. Concerning assets, the interviewees are asked for the market value of the personally owned real estate, financial assets, tangible assets, private life and pension insurance, consumer credits, and private business equity. The wealth balance sheets were elicited at the personal level. In a case of jointly owned assets, the personally owned shares were explicitly asked for. The fact that we can observe assets variable at an individual level is especially useful here as means-test for UA/SA/UB II benefits investigates asset holding of household at an individual level.

In the raw data, the total number of individuals is 279,007. People in the age range from 20 to 60 were selected to avoid education and vocational training and retired periods. Only employed household heads were used in the analysis to answer more properly to the research question: How people in work respond to changes in unemployment benefits by changing their saving level. Do people change their saving rate with respect to changes in the amount of unemployment benefit? If so, how much?

The dependent variable "saving rate" is calculated by dividing monthly household savings by monthly household income. Since 1992, the GSOEP questionnaires contain two questions concerning household savings. People are asked if they put aside some money each month and if so how much. The amount put aside each month will be used to measure monthly savings. The exact survey question on saving reads:*"Do you usually have an amount of money left over at the end of the month that you can save for larger purchases, emergency expenses or to acquire wealth? If yes, how much is it?"*

[18] For details, see Wagner *et al.* (2007) and the SOEP homepage at http://www.diw.de/en/soep.

[19] German SOEP - Socio-Economic Panel (DIW). From http://www.eui.eu/Research/Library/ResearchGuides/Economics/Statistics/DataPortal/GSOEP.aspx

Hence, it is not asked to report accidental savings but to report the usual amounts intended for savings, including savings to acquire wealth for old age. As precautionary savings are savings prepared for the case of income uncertainty, only gross savings are taken into account. In Gruber (2001), he uses the gross asset as the main interest claiming that "*Net assets reflect short run smoothing through consumption and loans*". In line with it, an illiquid asset is also not considered in the analysis as it cannot be used for consumption smoothing during the unemployment spell.

On the other hand, the fact that a certain amount of income is reserved in their account every month defining 'the monthly saving rate' accords with the precautionary behavior of households relatively well. Moreover, given that the periods for accumulating wealth are different for each individual due to differences in both age and education periods, it is more reliable to employ a monthly saving rate rather than wealth. An individual's wealth is considered only in case of defining the eligibility for benefits later on.

After this consideration, 10,951 observations in the pooled data are left in the final sample. A data description is presented in Table 1.3[20], except for the saving rate variable, which is a dependent variable in our estimation. Other variables listed in Table 1.3 are added in regressions as covariates. Selection of these variables are based on following criteria: 1) Whether they affect the screening process of eligibility status, and 2) Whether they are crucial factors for households to adjust the household saving rate. The amount of benefit in each year, which is the most important variable in identifying precautionary savings, should be generated through the simulation as it is not observable in the data. The following section describes the process in detail.

Calculation of Benefits: B_{it}

Concerning the simulation of the amount of benefit, this section consists of the following steps: 1) Defining household social minimum which consists of standard needs, housing and heating costs. This minimum indicates SA (Social assistance) before reform and UB II (Unemployment Benefit II) after reform, 2) Calculating the amount of UA before reform, 3) Defining the amount of pre-reform benefit from a function $max(UA, SA)$, based on the assumption that people will take the one which gives them a higher level of benefit. Throughout these steps 1)-3), we get

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[20] Not reported in the table, 31 percent of the final sample is single household, 32 percent are couples without children, 27 percent is a couple with children, less than 10 percent of sample belongs to single with children households respectively.

	Tab. 1.3: Descriptive Statistics	
Variable	Mean	Std. Dev.
Saving rates	0.0825	0.105
Household income	2747.81	1833.13
Spousal income	663.73	1144.07
Individual earnings	1656.16	1828.50
Rent (*Tenant=1*)	0.527	0.500
Gender (*Female=1*)	0.381	0.486
Nationality (*Foreign=1*)	0.0652	0.247
Number of children	0.537	0.780
Couple (*Couple=1*)	0.618	0.486
Region (*West=1*)	0.745	0.436
Education (*in years*)	12.931	3.195
Age	46.301	10.755
Net financial wealth	6731.79	75732.31

Note: In regression, household income, spouses income and net financial wealth were all normalized by dividing 1,000

"the expected amount of benefit for households" in both years before and after reform, 4) For households with needs exceeding allowable income, I carry out further checks of properties and assets that have to be exhausted before claiming benefits according to the subsidiarity principle. After this process, only people who are eligible for the benefits are expected to have a positive level of benefit. This process is visually described in Figure 1.1.

Standard rates

First, the household social minimum is calculated according to Table 1.2. Depending on the relationship with claimants, the household member receives a different weight compared to the standard rate of claimants. When the reform was in effect in 2005, the standard rate was applied differently for East and West Germany as shown in Table 1.2. Although this difference in the standard rate between West and East was removed in 2007, this removal did not apply to our case because SOEP is retrospectively surveyed, meaning we actually use data from 2006.

Housing Costs

Adding to the sum of standard benefits which vary depending upon the household composition, recipients can also claim their housing costs. In housing support, the rent and additional costs including heating and water are taken fully into consideration in the requirements calculation if claimants lie within the upper rent limits. If the rent exceeds the upper limits, the rent will be paid in full for six months, but the person entitled to aid is obliged to reduce the excessive

Fig. 1.1: Simulation Process of Benefit Calculation
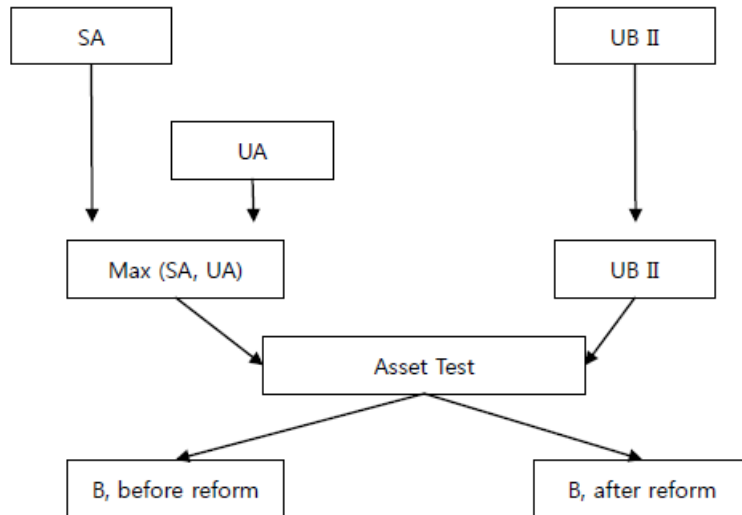
costs. Regarding housing support, State Capital Munich[21] provides a table of the upper rent limits, which describes the maximum amount of rent benefit that people can receive depending on the number of household members, the size of an apartment and building age classes. These upper rent limits include the amount of monthly rent and additional costs such as heating and warm water. For simplicity, the maximum limits are chosen in a calculation of housing support because more than fifty percent of values are missing for the monthly rents and heating costs in the data. The upper limits used in a calculation are shown in the Table 1.4[22][23].

For people who reside in their own property the interest due is taken over in cases of neediness in addition to the actual charges such as council tax, refuse charges or cold water. Mortgage repayment installments are not taken over[24]. The amount of benefit is topped up at a certain threshold so as not to provide excessive benefits. However, the support for homeowners is not clearly described in the regulation and it is largely at the discretion of the local job-center[25].

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[21] "Questions and Answers on Hartz IV in Munich." State Capital Munich Social Department, Sept. 2004.

[22] These upper rent limits vary according to the state and years reflecting inflation. This table possibly under-reports upper limit given this table was made in 2002. However, the rent limit guideline is not clearly open to the public and given its calculation applies to everyone equally, adopting this limit equally over time and through states is not problematic. To mitigate this drawback, state dummy variables and time dummy variables are properly added as control variables.

[23] If the rent exceeds the upper rent limits, the rent will be paid in full for six months. The person entitled to aid is obliged to reduce the excessive costs, e.g. through sub-tenancy.

[24] Questions and Answers on Hartz IV in Munich (2004)

[25] In Frick and Groh-Samberg (2007), before reform, SA could be claimed at SA offices, which acted on behalf of the German municipalities. After reform, the former UA and SA were combined to the new SA for needy

Tab. 1.4: Upper Rent Limits in Calculation

	Upper Rent Limits		
Number of persons	Apartment size m^2	Max. m^2 price	Upper rent limit including heating and warm water
1	20~45	13.50	429.50
2	35~60	12.40	644.30
3	50~75	11.30	760.80
4	65~90	10.80	837.50
5	80~100	10.80	907.30
6	95~110	11.00	1,012.00
7	110~135	10.23	1,063.49

Therefore, housing support for home owners is replaced with upper limits for tenants from Table 1.4 to be fair. Finally, the basic household need is generated by summing up total standard benefits of household members and housing supports.

Unemployment Assistance

In the second step, Unemployment Assistance (UA) before reform is calculated. As UA is calculated based on individual earnings, figuring out individual's monthly net income is essential here. In this research, an individual's earnings for the four years prior were traced in case income is missing in the data. In case the person's income is not tractable at all even after considering previous years, the observation was dropped from the sample.

The Amount of Benefit before Reform

As the third step, the expected amount of benefits that people would receive will be determined. In the case before reform, the social minimum benefit (Social Assistance) from step one and UA benefit from step two are compared, and the higher benefit between them is assigned to each person. It is based on the assumption that people whose calculated UA is below SA will claim the gap from the local authority to maximize their available income sources. In the case after reform, however, benefits from only one will be provided to claimants as the earnings-related benefit is not available anymore.

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employable people. Therefore, UB II claimants claim the benefits to SA offices. These SA offices will be written as a local job center, local agency, local offices or SA office depending on the context.

Means-testing on Assets

In the final step, the eligibility rule is applied. Unlike contribution-based unemployment benefit I (UB I), people cannot claim unemployment benefit II when another source of income is available. Household wealth and income of spouse are mainly considered here as the "*other source of income*".

First, to be eligible for benefits, assets have to be used up to a certain level. Counted as wealth or assets are generally all kinds of property which belong to the household members and which could be exploited economically. Two hundred Euros per year of life is protected and total a minimum of 4,100 Euro to a maximum of 13,000 Euro per employable person can be protected considering individual cases. Examples of assets are money in cash, savings such as securities, building society savings, house, and property as well as personal property. The self-used appropriate residential property as well as a reasonable car are not included in the assets and may be kept. This paper takes 'net financial wealth' information derived from a survey in 2002 and 2007 for the wealth check and classifies households holding net financial wealth exceeding the allowed exempt amount as 'ineligible households'.

The amount of protected life insurance was more or less same to the amount addressed above, thus life insurance must always be used up if the repurchase price exceeds the previously mentioned asset limits of 13,000 Euros. The life insurance can be protected as an old age pension scheme within this asset allowance if the utilization of the life insurance before going into retirement is contractually excluded by a restriction notice.

This protection limit of life insurance is known to be more generous in the new welfare system compared to that in the previous system. Before the reform came into effect, the life insurance was only protected up to a limit of 1,279 Euro. However, in practice, it seems that life insurance is flexibly exempt from eligibility criteria. For example, in a case of hardship the life insurance remained protected and people in need are able to claim benefits. This flexibility can be found in GSOEP data as well. When actual recipients of benefit system are examined, the average life insurance that they are holding in the data is over 8,000 Euros, and the maximum value even amounts to 15,000 Euros. The fact that people on benefits are holding assets above the eligibility limit shows that eligibility checks are highly at the discretion of the local agency, and results from the simulation are not able to be precise. In previous research, it was also found that there is a difference between the number of cases from simulation and cases observed from data. Plus, the gap between actual data and simulation can be large, especially when the asset check was taken into account.

For these reasons, the life insurance in GSOEP data is not included in the calculation and only net financial assets were taken into account for wealth checks. As this criterion makes the asset check less restrictive than the actual eligibility rule, results of the estimation considering life insurance in eligibility criteria are reported in sensitivity checks for comparison[26].

Other Household Member's Income

Although an individual's financial status shows that he is in need, he cannot claim the benefit if there exists a third person under the same 'needs unit' with claimants as the members in the same units are deemed to be responsible for supporting each other. Concerning the definition of the needs unit, §7III SGB II[27] specifies who belongs to this group. In general, every person living in the same household is assumed to be a part of the needs unit if the household budgeting is managed jointly[28].

In this paper, only spousal income is considered as the third person's income in defining eligibility status because it is not feasible to distinguish and separate multiple needs units for the simulation except spouses in GSOEP[29]. Therefore, if partner's current earning is enough to cover the social minimum of household, he or she is regarded as an ineligible person for benefits.

Results of Simulation

Throughout this process, we could define eligible and ineligible households in each year, and calculate the amount of benefit that eligible households can expect to receive. Table 1.5 describes the result of the benefit amount derived from this simulation for people in the final sample. According to this table, the average amount of benefits was reduced after reform from 1016 Euros to 870 Euros per month. The mean benefits sorted by household type are also presented in the third column. As expected, benefits for 'single households' (HH Type 1) were reduced much more than benefits for 'single with children households' (HH Type 5) were, because having a dependent household member like a child makes the sum of the standard payments higher,

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[26] The sensitivity of simulation model depending on how wealth and assets are taken into account is discussed in Frick and Groh-Samberg (2007).

[27] Social code second book (*Sozialgesetzbuch zweites Buch*).

[28] Anna K. Zimmer (2010).

[29] Concerning life partners, irrespective of whether married or not, an affiliation to the needs unit is assumed if the couple either has already lived together for more than one year or has a common child. But not every household member has to be part of the needs unit. Separate needs units are formed for instance by children of the person in need who are older than 25 years but still live in the same household, or who are younger but already have their own children. Generally, the burden of proof if one is not part of the needs unit rest with the person or households, not the local authority. In practice, this entails that not every household needs to coincide with the actual needs unit subject to the SGB II (Anne Karina Zimmer 2010).

	Ineligible	Eligible			
	Number of Obs	Number of Obs	HH Type	Benefit Amount	Mean
Before reform	2,265	3,211	Type 1	785.27	1016.48
			Type 2	676.54	
			Type 3	843.86	
			Type 4	868.58	
			Type 5	1283.11	
After reform	2,503	2,972	Type 1	576.51	870.66
			Type 2	532.57	
			Type 3	580.24	
			Type 4	535.47	
			Type 5	1209.31	
Total	4,768	6,183			10,951

Tab. 1.5: Number of Observations and Mean of Simulated Benefits

Note: household type 1 5 are indicated as below type 1: Single without children, type 2: Couple without children, type3: Couple with 1 child, type4: couple with 2 children, type 5: single with children respectively. Source: Own calculation using GSOEP

making the gap between UA and SA narrower.

Note that the direct comparison between the simulated and actual amount for coupled households is not feasible, as their simulated benefit is smaller than simple sums of the standard rate of household members. It is because spousal income was accounted for in the calculation. Assuming that spousal employment status remains unchanged, spouse or partner's current income was deducted from total benefit. In both periods before and after reform, around 40 percent people were ineligible for the benefits. This can be the case either when they hold assets above a threshold or when their spousal income is high enough to cover their calculated needs.

The incentive to reduce assets or working hours of spouses to be entitled to the benefit was not considered in the estimation for two reasons: 1) When it comes to the eligibility rule regarding spousal income or the threshold of wealth holdings, the reform in 2005 barely changed in comparison to the previous system. Rather, the asset threshold after the reform was slightly relaxed. For example, life insurance and financial assets are more generously protected under the new system, and even keeping a vehicle is also additionally permitted after the reform. Given that the first difference model is used as the main tool, this paper disregarded the concern above by assuming potentially unobservable factors, which make people more cautious about managing their assets, such as attitudes toward a risk that are time invariant. 2) Given that being unemployed is not predictable and the unemployment status is not realized as yet to people in the sample, it is not likely to be the case that household heads reduce their assets and their spouses

Tab. 1.6: The Number of Observations depends on the Change in the Amount of Benefits

Changes in benefit		Number of Observations	Proportion (%)
Increase in benefits		1225	0.224
Decrease in benefits		1982	0.362
Unchanged	Always ineligible	1618	0.296
	Remains the same	650	0.119

Source: SOEP, Author's calculation

reduce their working hours to be entitled to the benefits in preparation for potential unemployment. Thus, behavioral changes regarding asset accumulation or spousal working attitudes[30] in this context are disregarded.

However, this paper admits the fact that unemployment status that is not realized yet can obscure the argument as people may not change their attitude at all if they do not think their income stream and work status will be invariant for a long time. To ease this problem, the unemployment risk of household heads and their spouse was taken into account in robustness checks. The unemployment risk is derived by running a probit estimation taking an age, income, education, region, marital status and the number of children, gender and nationality into consideration.

Table 1.6 shows the composition of the sample by their different statuses concerning changes in the expected benefit amount. This change is derived not only by the reform but also by changes in household composition and the level of asset and income. That explains why 22 percent of observations receive more benefits after reform than before reform as shown in the first row of Table 1.6. Likewise, the reason that the expected benefit amount for 36 percent of people has decreased after reform is also partly from changes in the above mentioned elements. Note that there are also people whose expected benefit amount remains unchanged throughout the observed years. In this case either they have been ineligible for the benefit both in 2002 and 2007 or their calculated benefit remains unchanged in both years. The latter case is possible if an individuals household composition, household income, asset level, and region did not change over the years. Around 12 percent of people in the data fall into this group.

To check the validity of simulation, the amount of benefit that recipients in SOEP reported to having received is visually compared with the simulated benefit amount as Figure 1.2. In SOEP data, around 7 percent of total observations reports that they receive one of these benefits -

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[30] Though this is not the case here, Cullen and Gruber (1996) have shown that the labor supply of wives of the unemployed husband is strongly negatively correlated with unemployment benefits.

Tab. 1.7: The Comparison between Actual and Simulated benefits

		Number of Observation	Mean (Std.Dev.)	Min	Max	Correlation Coefficient
Before Reform	Actual	1730	1087.209 (370.44)	15	3058	0.4421
	Simulated	2058	1035.97 (520.33)	0	2914	
After Reform	Actual	3220	1066.33 (445.54)	29	2940	0.5226
	Simulated	3296	1003.04 (500.17)	0	2601	

Note: Calculated only for actual recipients who reported positive benefit amounts to survey questionnaire

UA/SA or UB II[31] each year, but many of them are not reporting the actual amount provided by local government. Among the cases where the benefit amount was reported, some cases do not seem to be reliable at all, only reporting one digit of the amount of benefit. It can be found in Figure 1.2, which shows the relatively low amount of benefit than the simulated one both before (*upper*) and after (*bottom*) reform.

Although the number of recipients found in the data is too few to make a comparison with simulated results, the average amount of benefits from actual recipients and simulation are quite similar as shown in Table 1.6. This comparison is made only for people who reported the positive amount of benefits, and that is why results from simulation have a larger standard deviation. The correlation coefficient between the reported amount and the simulated amount is around 0.5, which is quite moderate but could be higher up to 0.6 when only the positive amount of benefits from the simulation is used in the calculation. It can be explained, in part, that asset or household income threshold which SA agencies applied in practice is at their discretion. Moreover, around 20 percent of actual recipients in the data were not eligible for the benefit according to simulation due to their other source of income. This issue arises if people underreport their asset or other incomes from the third party within the needs units, or simply due to improperly collected data. If this is the case, the moderate correlation between the actual and the simulated benefit amount and the presence of ineligible recipients in the data can be explained to some extent.

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[31] As recipients whose calculated unemployment assistance before reform is below a social minimum can claim extra benefit 'Social assistance' from a local agency separately, the benefit amount from the two systems were summed in a case where recipients reported positive amounts from both benefit systems.

Fig. 1.2: The Comparison between Actual and Simulated Benefits
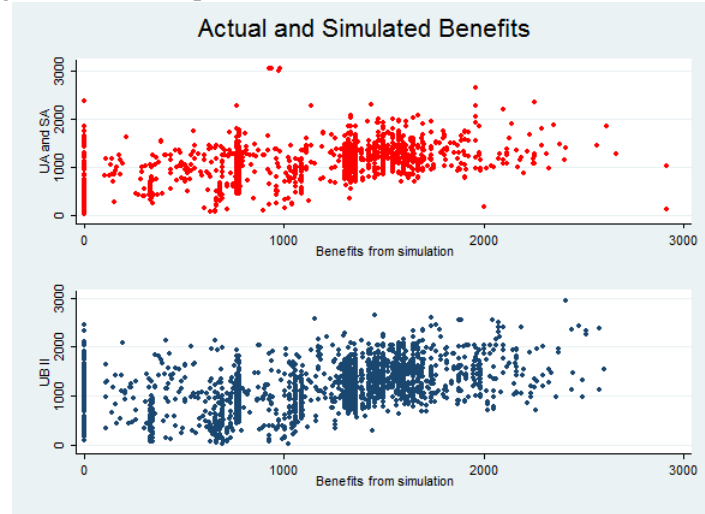
Note: The upper panel shows the correlation between benefits of actual recipients and simulated benefits before reform. The bottom panel shows the same comparison after reform.

These cases of 'ineligible recipients' were often neglected but began to be examined by a few researchers and given a name of "*Beta-error*". The term Beta-error is coined in Frick and Groh-Samberg (2007)'s paper for the first time to the authors knowledge, and is often used as a measure to examine the validity of simulation when a take-up of benefit is a matter of concern in research. Beta-error is calculated as a proportion of the number of ineligible recipients to the total recipients. It indicates that people who are ineligible for a benefit when related elements are considered claim to have taken up the benefit in survey questionnaire. As the eligibility status is assigned by simulation, the sizable number of beta-error may imply a failure of simulation. In Frick *et al.*(2007), they reported that approximately between 19 and 39 percent of recipients in the data fall into the 'ineligible' category according to their simulation. The size of this error varies depending on the extent of restriction they impose on the eligibility process. For example, when a restrictive asset check is applied, one is more likely to fall under ineligible cases, and it increases the size of beta-errors. Automatically, this stricter restriction decreases the number of "eligible but non-take-up" cases as it decreases the pool of eligible cases.

This increase in the number of "eligible but non-take-up" cases also indicates a miscalculation. Plus, the number of these cases moves negatively with that of the beta-error case, as a sort of "trade-off" relation. Namely, the increase (*decrease*) of beta-error is linked to the decrease (*increase*) in number of non-take-up cases. Thus, compromising a certain size of beta-error at some level is inevitable. The size of beta-error from the simulation in this paper is 20.6 percent, which is somewhat moderate compared to calculations from previous literature.

Reasons that this sizable beta-error appears are as follows: 1) Again, the appropriateness of asset and income level is largely at the discretion of the local agency. 2) Potentially, people may misreport their asset level to local agency differently from those that they provided to SOEP surveys. This is plausible if one is attempting to exploit benefit system, which cannot be taken into account in the simulation. 3) People may misreport their family member, who belongs to 'needs unit in family' and who has a financial responsibility for them prior to benefit claim, to the local agency, to be entitled to benefits.

Usually, typical household type categorized in SOEP is mostly consistent with a needs unit. However, there are some cases where separate needs units are formed by children who are older than 25 years but still live in the same household, or who are younger but already have their own children. However, these cases are very rare, and they are also counted as needs unit in this research because they are "children" even though they are not classified in the same needs unit according to social assistance law. As the burden of proof regarding needs unit is on households, not on the local agency, it is also very likely that people may report their family members in the household as a different needs unit to claim benefits. Those cases are not able to be considered in this simulation process.

Sensitivity Checks

Adding to the Tobit model, four robustness checks are implemented as an extension. First, I consider the new expected amount of benefits calculated by assuming that household head's spouse is also unemployed using a first difference estimation. In this case, the household head is more likely to be eligible for benefits, and the amount of benefit the household expects to receive increases. Although it is unlikely that the household head and his/her spouse are in unemployment at the same time, it is meaningful to compare the result in this set-up with the result of base estimation in a sense that the assumption -*Spousal unemployment status is neither affected nor changed throughout observation years*- made in the base model could be too restrictive.

Second, the unemployment risk of spouses is considered in a model by adding it as a covariate in the original model. This check comes from the concern that spousal job stability may also affect household's saving behavior. Spousal unemployment risk was proxied from the estimated probability derived from a probit model. Included variables in the probit model are the household composition, years in education, region and the nationality of the spouse. The result is not reported here.

Third, life insurance was taken into account for eligibility status. When life insurance is included in the eligibility criteria, the number of eligible households is substantially reduced. Around 1,800 observations become ineligible, and the mean and variance of calculated benefits decrease due to this stricter rule.

As the last check, Heckman's two-stage model is implemented from the concern that considering only the employed in the baseline estimation may induce a selection bias due to the presence of unobservable characteristics of individuals, which is both associated with employment status and with the saving behavior. If that is the case, the result without considering this factor can lead to a false attribution of causality. The specification for this estimation is shown as below.

Let's say the employment status follows a basic selection equation:

$$emp^* = A_i\alpha + u_i \qquad (1.3)$$

where $emp = 1$ if $emp^* > 0$ and $emp = 0$ if $emp^* \leq 0$.

In the first step of Heckman's procedure, the probit model includes variables which are used in the outcome equation, and also adds occupation variables for identification. By including estimated inversed *Mill*'s ratio in outcome equation, it is expected to adjust potential selection bias. When we simply modify the outcome equation as $S_{it} = \beta X_{it} + e_{it}$, the conditional expectation can be written as (1.4),

$$E[S_{it}|employed] = E[\beta X_{it} + e_{it}|A_i\alpha + u_i > 0] = \beta X_{it} + E[e_{it}|u_i > -A_i\alpha] \qquad (1.4)$$

and it gives a biased result when there is a correlation between e_{it} and u_i. We handle this selection bias issue by adding inversed *Mill*'s ratio which is calculated from the first step. Note that this model assumes e_{it} and u_i are independent of the explanatory variables with mean zero, and $u_i \sim N(0,1)$, which is strict and sensitive to model specification. For this reason, it is adopted here mainly to test the presence of the selectivity bias.

1.3   Results

1.3.1   Basic results

Basic results of the first difference and the random effect tobit model are shown respectively in Table 1.8. Note that the gender variable is dropped out from the results table of first difference model as it is time invariant. The marginal effect is reported in the Tobit model[32]. The estimated coefficients of the main variables show expected signs in both estimations. However, the results in the Tobit model report larger and more significant effects than those in the first difference model.

In both cases, it is found that the household saving rate increases with household income and net financial assets, indicating households with more financial resources save more when other conditions are equal. The effect of spousal income is negative and significant only in the Tobit model. As noted earlier, spousal income is accounted for in the model because it is the variable used in the calculation of the amount of benefit, and is likely to have an effect on a household's saving behavior given that a household head can take spousal income as an alternative income source in case he or she becomes unemployed.

Whereas the number of children in the household has no significant influence on the household saving rate, having children in any age range affects the household saving rate negatively in the Tobit model. Especially having a child aged over nineteen years old is significantly and negatively associated with the household saving rate, and having children in other age group showed a less significant but still negative influence on the household saving rate. This suggests having a child within a specific age range can be more indicative of household savings than number of children.

Although no significant effects were found from region, nationality and gender variables in the first difference model, these variables showed significant relations with the household saving rate in the Tobit model. According to the column (2) in Table 1.8, individuals in Western Germany and people without German nationality save less than people in Eastern Germany and people with German citizenship respectively, and households headed by women are likely to save less than men-headed households. Household head's higher education - measured by years in education- has a positive association with the household saving rate in both the Tobit and first

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[32] $\partial E[y|x, y > 0]/\partial x = \beta\Phi(x\beta/\sigma)$ marginal effects, at the means of independent variables. It is chosen among other marginal effects related to Tobit model as we are interested in the expected value of saving rate conditional on saving being in the uncensored region.

Tab. 1.8: Basic Regression Results

Variables	(1) First Difference	(2) Tobit Model
Benefit	-0.0124***	-0.0207***
	(0.00256)	(0.00129)
Household income	0.0155***	0.0113***
	(0.00115)	(0.000431)
Spousal income	0.000036	-0.00313***
	(0.00140)	(0.000655)
Number of children	0.000575	-0.000790
	(0.00596)	(0.00341)
Children 0 ~14 yrs old	-0.00828	-0.00785**
	(0.00653)	(0.00358)
Children15 ~18 yrs old	-0.00266	-0.00647**
	(0.00526)	(0.00289)
Children19+ ~ yrs old	-0.00899***	-0.00881***
	(0.00243)	(0.00112)
Couple	-0.00489	0.000686
	(0.00477)	(0.00176)
Region (west=1)	0.00640	-0.00476***
	(0.0122)	(0.00172)
Nationality (foreign=1)	0.0301	-0.00571**
	(0.0186)	(0.00286)
Gender (female=1)		-0.00451***
		(0.00152)
Rent (tenants=1)	0.0277***	-0.00186
	(0.00449)	(0.00157)
Years in education	0.00791***	0.00157***
	(0.00210)	(0.000235)
Age	-0.000476	-0.000352***
	(0.000307)	(0.000075)
Net financial asset	0.00794***	0.00876***
	(0.00156)	(0.000790)
Constant	-0.0431	
	(0.0299)	
Observations	10,909	10,909
Number of Observations	5,467	5,467

Note: Standard errors in parentheses *** p¡0.01, ** p¡0.05, * p¡0.1. Bootstrap standard errors are calculated in Tobit model. Benefit amount, household income, spouses income and net financial assets are all normalized by 1,000 in regression.

difference model, and the effect of age of household head showed a significant and negative sign only in the Tobit estimation.

The expected amount of benefit listed in the first row of the Table 1.8 showed a significant and negative relationship with the household saving rate. According to the result from the first difference model, an increase (*decrease*) in benefit amount by one unit lowers (*increases*) the saving rate by around 1.2 percent points. Although the benefit amount was normalized by dividing it by 1000, given that the average saving rate of households is only around 8 percent, this finding is not trivial. Depending on the applied models (including specification reported in Table 1.9), the size of coefficient increases up to around 2 percent points. As pointed out in the previous section, this implies the approximation of "crowd-out" of savings is driven by changes in the degree of benefits. The result of the Tobit estimation gives a similar implication which reports a slightly larger coefficient, which is also significant at 1 percent level. It shows that one unit change in the amount of benefit decreases the household saving rate by 2 percent points[33].

1.3.2 Sensitivity Checks

Table 1.9 reports the result of various estimations. The first column (1) is the result of estimation which assumed the case that both a household head and his/her spouse become unemployed. Column (2) is same as the base estimation in Table 1.8 except it adds spousal unemployment risk as a covariate in the model. Column (3) is a case which takes life insurance into account in deriving the eligibility status. These cases (1)-(3) were also estimated by a FD (first difference) and a Tobit (Random effect Tobit model) respectively. Note that only the results of crucial variables are selectively reported in this table.

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[33] The rho value was 0.45, which implies that panel estimator is different from the pooled estimator and considering panel structure is important in estimation. A likelihood-ratio test of this rejects the null hypothesis, which is not reported here.

Tab. 1.9: Results of Robustness Checks

VARIABLES	(1) FD	(1) Tobit	(2) FD	(2) Tobit	(3) FD	(3) Tobit	(4) Heckman
Benefit	-0.0106***	-0.0159***	-0.0101**	-0.0193***	-0.00683***	-0.0193***	-0.0158**
	(0.00188)	(0.000944)	(0.00448)	(0.00202)	(0.00257)	(0.00135)	(00325)
Household income	0.0156***	0.0112***	0.0188***	0.0116***	0.0156***	0.0110***	0.0145***
	(0.00115)	(0.000430)	(0.00172)	(0.000586)	(0.00115)	(0.000435)	(0.00092)
Spousal income	0.00139	0.000623	-0.00273	-0.00347***	-0.000022	-0.00175***	-0.00092
	(0.00130)	(0.000612)	(0.00189)	(0.000800)	(0.00135)	(0.000631)	(0.00129)
Years in education	0.00787***	0.00151***	0.00817***	0.00128***	0.00794***	0.00160***	0.00162***
	(0.00210)	(0.000234)	(0.00315)	(0.000301)	(0.00210)	(0.000236)	(0.00042)
Age	-0.000721**	-0.000449***	-0.000302	-0.000382***	-0.000281	-0.000344***	-0.00024
	(0.000315)	(0.000075)	(0.000458)	(0.000104)	(0.000305)	(0.000079)	(0.00015)
Net financial asset	0.00743***	0.00844***	0.0142***	0.0113***	0.00853***	0.00979***	0.0504***
	(0.00156)	(0.000777)	(0.00218)	(0.00125)	(0.00155)	(0.000812)	(0.00318)
Unemployment risk			0.0411	0.0605**			
			(0.0717)	(0.0287)			
Lambda							-0.0203**
							(0.0069)
Number of Observations	5,467		4,105		5,467		6866

Note: Standard errors in parentheses *** p¡0.01, ** p¡0.05, * p¡0.1. (1) is the case where both household head and spouse get unemployed, (2) includes spouse's unemployment risks estimated from probit model (3) considers life insurance in eligibility (4) is Heckman correction model, which considers selection on employment status in base model. FD is short for first difference model and Tobit indicates Panel Tobit random effects model in (1), (2), (3) respectively. Marginal effect is reported in Tobit model. Only the result of outcome model is reported in (4) Heckman model. All specification includes fully variables used in base model. Only crucial variables are selected here.

Overall, the results from sensitivity checks are barely changed compared to those from the base model, and the effect of the main variable "benefit" remain negative and significant especially. The effects of household income, net financial asset and years in education on household saving rate remain strong. The effect of spousal income is significant and negatively correlated with the household saving rate only in the Tobit estimation. The age variable shows a negative relation with the household saving rate as found in base estimation although its size is very small.

Notably, the significance and the size of the effect of 'benefit amount' seems pretty stable throughout column (1)-(3) showing only small difference. First, the coefficient in column (1) is slightly smaller than that of the baseline model. When the spousal unemployment status is assumed in the model as (1), people are more likely to be eligible for the benefit and the amount of benefit is higher than that in the baseline case if other conditions in a household are equal. Thus, the negative but smaller size of this coefficient suggests that the higher amount of benefits, derived from the assumption that a household head's spouse is unemployed, reduces the effect of benefit amount on the household saving rate. Estimation (2) is the case where spousal unemployment risk is taken into account as a covariate in the model. The unemployment risk is calculated from a probit estimation. The effect of spouse's unemployment risk on the household saving rate is positive in both models but significant only in Tobit estimation. The positive sign of this variable indicates that the higher unemployment risk of a spouse is linked to the higher saving rate of households. The size of the estimated coefficients of benefit variables is close to that in the baseline model.

The estimation (3) includes life-insurance in the means-test process. Because the inclusion of life-insurance makes the means-test stricter, many observations fall into the 'ineligible status' now having their amount of benefits re-coded as zero. Notably, the size of a coefficient of benefit variable in the first difference model dwindled to half of that in the base estimation. Now, the average saving rate, income, and asset level of people who still remain in the eligible group are lower than those of the initial eligible group in the baseline estimation because of the change in the composition of eligible/ineligible groups in the analysis. It implies that analysis without considering the life insurance may overestimate the crowd-out effect on private savings. As noted earlier, the interpretation of column (3) remains incomplete due to the potential discretion of the local agency. However, it was consistently verified that the effect of unemployment benefit is negatively related to household saving rate.

This conclusion is reaffirmed in the specification (4). Here, only the result of the outcome estimation of the Heckman model is presented in the table. Again, the main results and main covariates showed consistent effects we have verified so far. The size of the effect of the benefit

variable is moderate, falling in the range between 0.0101 a *minimum* from column (2) in Table 1.9 and 0.0207 a *maximum* from the baseline model in Table 1.8. Note that the coefficient of inversed *Mill*'s ratio is significant and gives a negative sign. It indicates that unobservable factors which we are concerned with are negatively correlated with each other. It implies those who select themselves into employment tend to save less than a random selection from the population with a comparable set of characteristics. Although the application of the Heckman two-stage model here is formulated alternatively, repeated estimations consistently indicated the evidence of 1) the presence of selection and 2) the moderate size of the effect of benefit amount with 1 percent significance level. Therefore, this paper takes this result as more support and evidence of the presence of precautionary savings.

1.4   Conclusion

As noted earlier, the empirical tests of the precautionary savings have produced somewhat mixed results. To verify the presence of precautionary motives in saving behavior, this paper used the exogenous variation of income risk across individuals, which is induced by the reform on unemployment benefit II in 2005 in Germany. Throughout various specifications, this paper verified the presence of precautionary savings consistently which indicates that people in employment status increase the proportion of household savings to their household income in response to changes in the amount of unemployment benefit II induced by the reform in 2005. This result was robust against different set-ups in specifications.

The magnitude of the effect found in this paper is quite moderate. For example, for a household head whose household income is 5,000 Euros per month, the increase of benefit amount by 1000 Euros per month led to the decrease of savings by 100 Euros ($5,000 * 2\%$) when the coefficient of benefit variable from the Tobit estimation in the base model is applied[34]. However, given that it is a 'monthly saving rate' adopted as a dependent variable, and unemployment benefit II is not universally applied to everyone like public pension system is, this research puts a strong emphasis on the presence of a precautionary motive in savings.

In spite of the attempts to make the calculation of benefits as precisely as possible, this paper admits that measurement errors can be present and can be sizeable in practice because claimants

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[34] Feldstein (1974) uses aggregate time series data from U.S and reported a crowd-out effect ranging from 30 to 50 per dollar of pension benefit amount depending on the specification. Michael Hurd, Pierr-Carl Michaud and Susann Rohwedder (2009) found evidence of the effect of public pensions on accumulated financial assets ranging from 23 to 44 cent for every additional dollar of public pension wealth.

may often misreport their assets, income and the presence of a third person who belongs to the same needs unit to falsely claim benefits for which they are not eligible. Also, the evaluation of one's eligibility and the amount of benefit that recipients can claim can be at the discretion of government agency to some extent. All these factors might hinder a precise calculation of the amount of benefit.

Despite these drawbacks, from the consistent findings which show moderate changes in the saving rate of households, this paper concludes that German households perceive the changes in benefits by the reform in 2005 as an increased income risk and prepare for it themselves by raising the portion of monthly household savings to household income. Resultingly, this paper argues that Hartz IV reform, at least for people in employment, accords with the policy goal in a sense that people do not perceive unemployment benefit II as their financial safety-net and tend to take more responsibility at the household level.

This finding is in line with the positive evaluation on Hartz IV, the effect of which is still controversial after ten years since its introduction. Launov and Wälde (2013), for example, argued that the Hartz IV laws had indeed no noteworthy impact on the decrease of unemployment in Germany, whereas Hartz I to Hartz III reform appear to have been more helpful. However, there is also an argument that unemployment rate of the long-term unemployed is rather reduced by the reform, and even that the reform improved the welfare of the employed[35]. From the point of welfare distribution, there is a criticism that this reform has accompanied inequality and poverty throughout the nation. This mixed evaluation on Hartz IV indicates that more amendments to this system need to follow to meet various policy goals. These will be left to further research.

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[35] Krebs and Scheffel (2012)

2. IMMIGRANTS AND WELFARE (HARTZ IV) TAKE-UP

ABSTRACT

Disproportionately represented immigrants amongst welfare recipients have raised concerns that immigrants will become a fiscal burden and drain welfare resources in host countries. Despite massive influx of immigrants in recent years, this topic has rarely been visited so far in academic research. This paper fills the void by examining immigrant welfare take-up behavior in Germany using SOEP data (2007-2010). Among many socioeconomic characteristics taken into account as a factor of welfare take-up behavior of immigrants, individual unemployment status is especially highlighted due to its decisive influence on benefit take-up. To resolve the endogeneity problem that arises from unobservable common causes for unemployment status and welfare take-up, this paper uses individual eligibility status as an instrumental variable. The eligibility status is derived from a simulation designed according to descriptions in the social code book *(SGB II)*. From the consistent findings through various specifications, this paper concludes that immigrants are significantly more likely to be unemployed, and that leads them to fall into the welfare trap. When the endogeneity is taken into account in the model, it is found immigrants are not especially more prone to take up benefits than natives.

2.1   Introduction

According to the latest calculation from the Federal Statistical Office[1], the number of immigrants entering Germany has increased to 667,000 people in the first half of 2014, which means a rise of an approximately 20 percent compared to the first half of 2013. For the fourth time in a row, Germany has a double-digit growth rate in regards to immigration in the first half of a year. This increase in immigrants positions Germany as the second most common destination for migrants after U.S. according to OECD data.

In accordance with these increasing numbers, public concern over immigration is growing as immigrants are seen as competing with them for finite resource including jobs, political power and cultural influence in many cases. Especially for a country like Germany, which has a relatively generous state welfare system, people appear to be concerned that immigrants claim state benefits without making enough contributions and that they will become a fiscal burden on German taxpayers. A term "Welfare tourism *(Wohlfahrtstourismus)*[2]" appears in media often lately reflecting this growing concern of German people. According to the latest *DeutschlandTrend* opinion poll published in January 2014, more than two thirds agree that those who are not coming to Germany to seek work should be forced to leave.

In contrast to this concern that receiving immigrants will end up with a sizable fiscal burden in the host country, interests of economic scholars have been mainly focusing on immigrant's influence on natives in terms of labor market outcome such as wages and employment. The main reason that studies concerning immigrants have been weighted toward labor market outcome is that governments regarded the migrants as temporary labor, not as immigrants in any sense, especially in Germany until recently.

However, a massive number of immigrants have been entering Europe, and many of them are now transitioning to long-term residents in host countries including Germany. This change requires the host country government to be prepared with a more systematic immigration policy to make the immigration beneficial to both natives and immigrants. Helping immigrants integrate into the host country and ultimately making them financially independent is the most crucial preparation. When immigrants fail in this process and end up living on state benefits in host countries, it could become a vicious circle caused by a toughening natives perception on

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[1] "Zuwanderung Nach Deutschland Im 1. Halbjahr 2014 Erneut Angestiegen." Statistisches Bundesamt, 19 Feb. 2015.

[2] Concept of EU immigrants claiming state benefits without having worked and made a social contribution themselves

immigrants so making integration far more difficult than it was supposed to be. As the numbers of immigrants entering developed countries are increasing, this topic is likely to be a tough issue in the future. Germany's case would be especially noteworthy given that Germany provides relatively generous welfare benefits to its residents who are suffering from hardship, compared to other developed countries.

A large volume of research regarding immigrants has been mostly devoted to their influence on the labor market in host countries so far. How the job market and average wages will respond to the influx of new type of labors were the main topics in analysis, particularly in the beginning stage of immigration as immigrants were not regarded as permanent residents historically. The issue of welfare useage of immigrants arises relatively recently as the duration of their stay becomes longer, and the number of cases of immigrants claiming benefit increases. In this change of climate, some researchers began to investigate this topic. In line with these growing interests, this paper attempts to pose a question as to whether immigrants in Germany are more likely to live on state benefits than natives and suggests the policy implication based on those findings.

As a traditional immigration country, much research has been conducted in the U.S. compared to Europe. Borjas and Trejo (1991), for example, found that immigrant's use of social benefits in the U.S. increases dramatically in the 1970s, mainly due to the weaker labor market status of new immigrant cohorts in the 1960s. Moreover, they also found that immigrants are more likely to take up benefits as they stay longer in the host country. This "assimilation into welfare" is known to be induced by an immigrant network and shared information within immigrants community. On the other hand, Backer and Benjamin (1995) found somewhat different results in Canada. Their result showed that immigrants in Canada consume less unemployment benefit, social security and housing support than natives.

Results of studies in Europe are more mixed depending on which country is examined. According to Blume and Verner (2007), immigrants received over 18 percent of social benefits in Denmark in 1999, even though their population share was less than 3 percent. Hansen and Lofstrom (2003) found that recent Swedish immigrants used up more social security than they did in the 80s, mostly due to the changes in composition of immigrants and the higher unemployment rate among them. They also found evidence that immigrants assimilate out of welfare in Denmark, but the gap in benefit take-up rate between immigrants and natives still remains after 20 years of their stay.

The disproportionate participation of immigrants into welfare system in host country was also

examined in Germany. Previous research revealed that immigrants are highly dependent on benefits, observed in the raw data although the gap in take-up rate between natives and immigrants becomes insignificant once socio-economic characteristics are controlled in the estimation.

Castronova *et al.*(2001) opened this topic in their paper with a statement *"A group with high eligibility rates, all else equal, may be considered economically unfortunate or even victimized. A group with high take-up rates, all else equal, is less likely to be granted such sympathy"*. Using 1996 cross-section GSOEP (German Socio-Economic Panel) data, they restricted the sample only to the eligible for benefits and examined whether immigrants tend to take up social benefits more than natives do when individual's eligibility status is considered. As their result revealed that there is no significant difference in take-up behavior between natives and immigrants, they argued that immigrants are just more likely to have eligible status and they do not particularly take up more benefits than natives, when other conditions are equal.

Riphahn *et al.* (1998, 2004 and 2012) base their research on a more general question of whether the observed difference in welfare take-up between natives and immigrants can be explained by observable characteristics. As earlier findings from Castronova *et al.*(2001), she found that initial differences between natives and immigrants are mostly explained by socio-economic characteristics, and immigrant status has no influence on welfare take-up anymore once those characteristics are controlled for in the model. From the findings, they suggested a policy implication that the selecting process of immigrants at the early stage of immigration is more important to achieve immigrant-related outcomes in Germany.

Although Castronova *et al.* (2001)'s method is clear to design, selecting observations based on calculated eligibility status can be risky because this calculation may face a sizable measurement error so-called "beta-error[3]". Also, it eliminates available information by discarding observations to a large extent. Thus, this paper poses the research question along the typical lines - as Riphahn and Wunder (2012)- , of whether immigrants are more dependent on social benefits than natives when other characteristics are taken into account, without selecting a sample based on eligibility status.

There are some reasons that this question is revisited in this paper. First, the welfare benefit in the analysis of this paper is a new benefit system so-called "Hartz IV"[4] which is mainly provided to the unemployed and which went through a substantial reform in 2005 from the unemployment assistance. Second, using more recent data in 2007-2013, this paper covers the

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[3] Cases where observations are assigned as "ineligible for benefit" in simulation but are observed to have claimed the benefit in data Section 3-3) covers this issue more.

[4] See section 2.

more up-to-date behavior of natives and immigrants. Third, an individual's unemployment status was simply used as a control variable in previous literatures although it is likely to cause an endogeneity issue in the model due to unobservable factors related to unemployment status and welfare take-up simultaneously. This potential endogeneity issue will be checked and adjusted by instrumenting the individual unemployment status with an instrumental variable.

An individual's unemployment status is one of the main causes that people claim benefits - especially the Hartz IV benefit. However, a person's unemployment status can be endogenous with a decision to take up benefits due to commonly unobservable characteristics which affect both the unemployment status and the take-up decision. Thus, this paper adopts 'the eligibility status', which is counterfactually simulated in accordance with SGB II[5], as an instrumental variable of individual unemployment status to take the endogeneity issue into account. First, it verifies a relationship between immigrant status and welfare take-up behavior without considering individual unemployment status (*unconditional case*) and it attempts to show how the unemployment status influences a take-up decision of individuals, especially of immigrants (*conditional case*).

As the main result, it was found that immigrants are more likely to take up benefits than natives, regardless of whether individual's unemployment status is considered in the model or not. However, the extent to which immigrant status affects the take-up decision is reduced by half when their unemployment status is accounted in the model. When the potential endogeneity problem is eliminated in the model by taking the eligibility status as an instrumental variable, the results showed that immigrant status itself is not a significant factor of welfare take-up behavior. Through analysis of estimation results, this paper argues that the initially strong influence of immigrant status on benefit take-up behavior is mostly driven by its effect on unemployment status, not because immigrants have a higher tendency to take up benefits. Thus, this paper emphasizes the role of government in regards to poor immigrant job prospects rather than imposing restrictions on their access to the welfare program.

This paper uses SOEP Panel data and adopts the instrumental variable Probit estimation as the main specification. This process will be presented in section 3, and details of endogeneity problem, construction, and validity of instrumental variables will be described additionally. Results of the estimation and policy implication will be shown in section 4 and 5 respectively. To begin with, the historical background of immigration in Germany and the definition of benefit system adopted in the analysis will be introduced in next section.

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[5] Social Code second Book (*Sozialgesetzbuch zweites Buch*)

2.2 Background

2.2.1 Immigration in Germany

The history of immigration in Germany goes back to the 1950s after the Second World War. Since the late 1950s, West Germany needed to supplement its work force in an expanding economy. To alleviate labor shortage in growing industries, the West German government reached the agreement to import foreign labors for a limited duration as a name of *"Guest workers"*. Starting the first agreement with Italy in 1955, treaties with Greece and Spain (1960), Turkey (1961), Morocco (1963), Portugal (1964), Tunisia (1965) and Yugoslavia (1968) followed in turn.

After the division of Germany in 1945, East Germany also faced a labor shortage. Due to political reasons, however, most of the guest workers in East Germany were from the Eastern Bloc such as Vietnam, North Korea, Angola, and Cuba. Their working opportunities were controlled by the Stasi and working conditions were much harsher than those in West Germany. They were almost forced to go back to their home country immediately after their working duration ceased and around 80 percent of them were deported or sent back to home country after reunification due to the rising tide of xenophobia in former East German territories[6]. Therefore, immigrants before German reunification only refer to those in West Germany here.

This influx of guest workers was no longer permitted after November 1973 due to the oil crisis and following economic shock. However, the immigrant population had increased steadily through the 70s and 80s because of the remaining guest workers, who were initially supposed to leave after their contract expires[7], and subsequent immigration of their family members. According to estimates from the Federal Statistical Office, some 14 million guest workers and their families have come to Germany since 1955.

The large influx of immigrants reappeared after Berlin wall came down in 1989. So-called ethnic Germans *(Aussiedler)* who had lived in East Europe and the Soviet Union surged into Germany seeking better life conditions[8]. Two things should be noted here, regarding this group:

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[6] BAMF - Bundesamt für Migration und Flüchtlinge - Ethnic German resettlers, www.bamf.de/EN/Migration/Spaetaussiedler/spaetaussiedler-node.html

[7] The halt to recruiting workers affected all countries except Italy, which had been a founding member of the European Economic Community. EU enlargement in the ensuing years ultimately enabled the citizens of Greece, Spain, and Portugal also to enjoy freedom of movement.

[8] OECD Social, Employment and Migration Working papers 2007, "Until 1986, after World War II, around 20,000-60,000 people annually entered into Germany. This number surged with the collapse of the Iron Curtain, these flows increased massively in 1990, almost 400,000 ethnic Germans entered Germany. Currently, they are

1) The influx of this group had no links with labor market needs in Germany. 2) As Germany stuck to the *Jus sanguinis* (right of blood) system back then, special acceptance process applied to ethnic Germans to help them settle-down more easily[9]. Due to the lack of German language skills and information, their socio-economic characteristics were less competitive than natives in the German labor market. However, the certification procedure was carried out by the Federal Office of Administration[10] without any difficulties for them because German ethnicity was the key in the acceptance process.

Almost 4.5 million ethnic Germans including their family members have immigrated to Germany since German government began to accept this group of immigrants in 1950. Although the number of immigrants has been decreasing steadily since mid-1990, they are still the second largest immigrant group after "Guest workers". As their socio-economic characteristics in labor market are disparate from those of the natives, there have been concerns in separating this group from immigrant category and regarding them as a part of the German population in research because it could mislead the results of research. Fortunately, SOEP (German socio-economic panel data provided by DIW in Berlin), which is used in this analysis, provides not only one's citizenship information but also a "country of origin" variable. This feature of SOEP makes the identification of ethnic Germans in data feasible.

Even though there was a huge influx of immigrants over more than four decades, it was in 2005 that the German government enacted immigration law and admitted its *de facto* status as an immigration country. This law is aimed at promoting immigration of especially high-skilled labor and the integration of current immigrants. This initiative came from concerns over the shrinking labor force and aging society due to demographic changes in Germany. Since the new law was in effect, the way to find a job and stay in Germany was broadened for foreigners[11]. Subsequent expansion of the EU countries boosted the influx of new immigrants in Germany as well. Since the late 2000s, Germany has risen to become the world's popular destination for permanent migration, overtaking the U.K and Canada. According to an OECD study 'Migration Policy Debates' published in 2014, Germany attracted 400,000 permanent immigrants in 2012

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the biggest single group of immigrants. The inflow of Ethnic Germans dramatically decreased after the mid 1990s partly due to stricter acceptance from German government after the peak of their entrance in 1990. i.e Required to pass language test for the legal status of ethnic Germans *(Spataussiedler)*"

[9] legal basis for accepting ethnic German repatriates is the Federal Expellees Act (BVFG)

[10] Family members can apply to immigrate to Germany together with ethnic German resettlers who are applying for entry though they have been required since 1 January 2005 to prove that they have a basic knowledge of German. Adding to that, Ethnic German resettlers and their family members are legally entitled to attend an integration course free of charge.

[11] Introduction to Immigration to Germany. (n.d.), from
http://www.workpermit.com/germany/employer1.htm

and ranked at the second place following the U.S.

2.2.2 Hartz IV

In this research, the scope of benefits in the analysis is limited to Hartz IV. This benefit is somewhat broader than the social benefit chosen as a dependent variable in Castronova *et al.*(2001) because Hartz IV combines social benefit and unemployment assistance into one package since the reform in 2005. Hartz IV was the last series of Hartz reforms named after *Peter Hartz* who led the reform of German labor market and job agency, aiming at activating the German labor market. While Hartz I-III [12] faced little resistance from citizens in its enforcement, Hartz IV has been continuously criticized since its introduction because it was designed to reduce the amount of benefit that eligible people expect to receive when their household and financial conditions remain the same as before the introduction.

Before reform, there were two tiers of income support measure for the unemployed in Germany - Unemployment benefits (UB) and unemployment assistance (UA). Like unemployment insurance, unemployment benefits offer 67 percent*(63)* of previous income for a household with children *(without children)* when they become entitled to the benefit. It is contribution-based and hardly changed throughout the Hartz reform except the fact that the maximum duration of entitlement for people aged over 55 became reduced from 48 months to 24 months in 2006.

Unemployment assistance was provided in a case either where one is not eligible for unemployment benefit or where the duration of entitlement to unemployment benefit has expired. Unlike unemployment benefits, unemployment assistance was tax-based and earnings-related. The replacement rate of the benefit amounts to 57 percent*(53)* of one's previous earnings if one has a child *(no child)*. When the amount of benefit calculated from this system could not cover the social minimum level of one's household, he/she is able to claim social assistance to local agency and the gap could be transferred[13].

Due to the generous amount of benefits in this system and the lack of incentives for recipients to work because of that, this system had faced criticism from scholars and politicians that it

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[12] Hartz I dealt with the foundation of Personal Service Agenturen and supported vocational training from the German Federal Labor Agency. Hartz II defined new types of employment, so-called Minijob and Midijob, with lower or gradually rising taxes and insurance payments. It also attempted to encourage entrepreneurs by supporting a grant conditionally - known as the 'Ich-AG' (Me, Inc). Hartz I and Hartz II came into effect on January 1, 2003. Hartz III was in effect since January 1, 2004. It aims to restructure and reform the Job Centers.

[13] By the act of "Fourth Act for modern services on the labor market", the former unemployment benefits II and social assistance have been merged into the newly introduced unemployment benefit II, regulated in the newly created SGB II.

encourages the long-term unemployed to fall into the welfare-trap. The reform in 2005 was designed to overcome this situation and to serve its purpose as a final life support. Through the reform, the amount of benefit becomes capped at the household social minimum level, which is calculated based on the household composition regardless of individual's previous earnings[14].

This newly designed unemployment benefit II (Hartz IV) is regulated in the newly created SGB II. According to the SGB II, UB II is a basic financial support granted to employable people in need to assure their livelihood. Employability is defined as being capable of working at least 3 hours a day under normal conditions of the labor market. People aged between 15 and 65 years who reside in Germany and are not currently in education or internship, studying or being in early old-age retirement can be entitled to the benefit.

Immigrants holding German citizenship have no particular difference from Germans regarding access to social security. In case they are keeping their foreign passports, the eligibility rules are more strictly applied, but they are not excluded from the entitlement. However, they need to possess a work-permit in Germany, and their purpose of stay must not be solely confined to job-seeking[15]. In some cases, there is a possibility that the prolongation of the right of residence or an improvement of immigrant status can be rejected if they are eligible for means-tested public support. However, up until now, immigrants from an EU member state, which signed the European Convention on Social and Medical Assistance (EFA)[16], have a right to claim social benefits from Germany - and each other's countries- and are protected from this sanction on their immigrant status.

2.3   Data and Specification

2.3.1   Data: GSOEP

The German Socio-Economic Panel (GSOEP) is a longitudinal survey of approximately 11,000 private households in the Federal Republic of Germany from 1984 to 2012, and Eastern German länder from 1990 to 2012, produced by DIW Berlin[17]. In this paper, data from 2007 to 2010

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[14] The details of calculation will follow in section 3.

[15] According to section 23 III SGB XII, foreigners have no right to social assistance if their title of residence permit is solely based on job searching activity.

[16] Signed in 1953, this covers immigrants from EU member states, Iceland, Norway and Turkey. From the member states that joined in 2004, this only accounts for the citizens of Estonia and Malta.

[17] For details, see e.g. Wagner *et al*.(2007) and the SOEP homepage at http://www.diw.de/en/soep.

was used to analyze welfare take-up behavior of natives and immigrants after Hartz IV reform. Variables in SOEP include household composition, employment, occupations, earnings, health and satisfaction indicators[18]. The original sample from West Germany includes oversampled immigrant groups which mostly consist of guest workers who entered Germany during 60s and 70s. In 1995, a new immigrant sample was added to GSOEP which mainly came from East Europe after the Berlin wall came down in 1989. This new sample includes ethnic Germans, and GSOEP provides the country of origin of this group which makes it feasible for them to be categorized based on the country of origin not on citizenship. The biggest group of immigrants in the sample is the guest-worker group that is followed by an immigrant group which entered the data in 1995 and in 2006. [19].

As SOEP provides information about "Country of Origin", it is feasible to distinguish first and second generation immigrants. In the following, a term 'first generation immigrants' is defined as "A group of people who were born in other countries". It mainly includes ethnic Germans and guest workers. 'Second generation immigrants' are defined as "People who are of migrant origin but born in Germany". Natives are defined as "Persons of German nationality, born in Germany, and whose parental information indicates they are German"[20].

As unemployment benefit II is provided at household level considering one's household composition, only household heads are used in the analysis. The sample is restricted to people aged between 20 and 60 years to avoid education/vocational training and retirement periods. Only people who are able to work remain in data as people incapable of working can cover their living expenses by claiming social assistance, not unemployment benefit II[21]. For the same reason, people currently in their education, traineeship, social or military service or in early retirement are also excluded from the sample. A household is considered to be claiming unemployment benefit II if the questionnaire on the household reports a UB II receipt for the month of interview.

In pooled final sample, data consists of 18,511 natives, 2,015 first generation immigrants, and

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[18] Introduction to Immigration to Germany, from http://www.workpermit.com/germany/employer1.htm

[19] From innovation sample.

[20] According to documents from DIW, the native category includes people who were born in Germany with German nationality but whose parental information is not available. Thus, this classification may underestimate the number of second generation immigrants.

[21] After the "Fourth Law for Modern Services in the Labour Market" (Hartz IV) took effect on 1 January 2005, subsistence payments pursuant to SGB XII on "public assistance" have only been received by persons in need of assistance who are not able to earn a living and cannot support themselves from their own resources (for instance property) or benefits of other social benefit institutions. These include, for example, persons who are temporarily incapable of earning, long-term sick or early retired people with the low pension.

Tab. 2.1: Household Composition of Native Germans and Immigrants

	Natives	1st generation Immigrants	2nd generation Immigrants
Single	38.9%	29.5%	46.7%
Single without children	27.3%	17.2%	33.8%
Single with children	11.6%	12.3%	12.9%
Couple	44.3%	59.9%	35.4%
Couple without children	28.0%	30.5%	17.3%
Couple with children	16.3%	29.4%	18.1%
Other type	16.7%	10.6%	18.5%
Total	18,511	2,015	1,169

Source: SOEP 2007-2010, weighted, $n * T$: 5-9 percent of each group which is not categorized into any household type above due to missing observations was dropped out in final sample

1,269 second generation immigrants. In composition of (first generation) immigrants, Turkish occupies the largest portion (20%) as a single nation and is followed by immigrants from Ex-Yugoslavia (18%), Poland (12%), Russia (9%) and Romania (7.5%) in order. One-third of first generation immigrants entered Germany in the 1990's and a quarter of immigrants came to Germany in the 1970's and 1980's respectively.

Table 2.1 describes the household composition by immigrant status. As immigrants are over-sampled in GSOEP, the data is weighted in Table 2.1 to get an informative interpretation. According to the table, almost thirty-nine percent of natives are single, and around 44 percent of them are couples. The proportion of single household type is the lowest for the first generation immigrant group, and the percentage of the first generation immigrant group that have children in a household is higher than that of natives regardless of whether they are a single or a couple. It implies that first generation immigrants are more likely to be in a financially difficult situation and also be eligible for benefits. The single-with-kids household type also takes a large portion in the first generation immigrant group than in natives. Given that this type is more likely to be financially vulnerable than any other household types, it suggests that first generation immigrants are more likely to claim benefits as well.

Almost half of the second generation immigrants fall into the single household type, and a third of them are single without a child. The proportion of coupled households is the lowest in the second generation immigrant group, and half of this group are childless. These characteristics of the second generation immigrants reflect their younger age. "Other type" is a household reporting neither a partner nor a child living together but living with other people. Regarding "needs unit", which is a term used in the process of sorting out one's eligibility status and

Tab. 2.2: Welfare receipt of Immigrants and Natives by Household Type

	Native	1st generation Immigrants	2nd generation Immigrants
Single household	0.102	0.196	0.107
Single with children	0.235	0.367	0.245
Couple	0.039	0.082	0.015
Couple with 1 child	0.028	0.078	0.046
Couple with more than 2 children	0.076	0.156	0.129
Other type	0.072	0.089	0.019

Source: SOEP 2007-2010, *Weighted*

defined as the scope of people in charge of one's financial hardship in a household, details of this household type will be revisited later.

Table 2.2 describes the welfare receipt trend of immigrants and natives by household type. The description here reflects the strong relationship between the household type and dependence on welfare benefits. Single-with-children household type, for example, shows the highest rate of benefit receipt regardless of immigrant status. Coupled household with more than 2 children also shows a higher dependency than coupled households or coupled household with one child, implying that having an additional child in a household is likely to be linked to claiming benefits. Regardless of whether they have a child or not, it is found that coupled households have a lower rate of welfare receipt than single households do. It suggests that having an additional adult in a household may reduce the financial burden to some extent. Throughout estimations in the next section, it will be examined whether this higher dependency on benefits, which varies depending on immigrant status and household types, remains significant when other characteristics of households are taken into account.

2.3.2 Specification

Firstly, a specification which is unconditional on individual unemployment status is defined as a baseline model. It is expected that the immigrant status would be relatively more strongly influential on welfare take-up behavior when individual unemployment status is not taken into account than when it is. The conditional case is a model designed to clarify the effect of immigrant status on welfare take-up considering individual unemployment status, and will be compared with the unconditional case. The difference in the result between the unconditional and the conditional case suggests the extent to which the take-up decision is influenced by individual unemployment status. In previous literature, Bruckmeier and Wiemers (2011) and Riphahn

and Wunder (2012), the conditional case was more generally used in estimations.

As the main estimation, a random effect panel probit model is applied to both unconditional and conditional cases, in order to consider a panel structure of data from 2007 to 2010 and to derive a behavioral interpretation which is instructive and analytically convenient. Let y_{it}^* be the probability of claiming benefits based on their valuation of costs and benefits in households, which is unobservable in data. What we observe is a dummy variable y_{it}, which indicates the welfare take-up decision as $Yes = 1$ or $No = 0$. If one finds that taking-up the benefit is more beneficial, it is shown in data as a take-up decision ($= 1$). This is shown in equation (2.1).

$$y_{it} = \begin{cases} 1 & \text{if } y_{it}^* > 0 \\ 0 & \text{Otherwise} \end{cases} \tag{2.1}$$

And specifications follow as below:

• Unconditional Case

$$y_{it} = \mathbf{1}(y_{it}^* > 0) = \mathbf{1}(\alpha_0 + \delta_0 I_{it} + x_{it}'\beta + \epsilon_{it} \geq 0) \tag{2.2}$$

• Conditional Case

$$y_{it} = \mathbf{1}(y_{it}^* > 0) = \mathbf{1}(\alpha_0 + \delta_0 I_{it} + \delta_1 U_{it} + x_{it}'\beta + \epsilon_{it} \geq 0) \tag{2.3}$$

This is a standard Panel Probit model[22], where $\mathbf{1}$ denotes the indicator function. i indicates individuals and t denotes a time of year. I_{it} denotes immigrant status and y_{it} is a binary variable which indicates whether one takes up unemployment benefit II or not. Thus, δ_0 identifies the effect of immigrant status on welfare take-up. x_{it}' indicates the socio-economic characteristics of a household and its household head i. It includes detailed information on household composition and household head characteristics such as age, sex, health status, and years in education. Years since migration, language level and regional dummies were included as immigrant specific factors.

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[22] As a default, STATA provides a random effect Panel Probit model. It is preferred in this analysis for the following reasons. First, the variable in our interests, "immigrant status" has no variation within a household over time so the model designed with fixed effects cannot identify the effect of this variable. Second, the fixed effects estimator uses time-demeaned data, and the fixed effects model has little explanatory power in our case.

If $\epsilon_{it}|U_{it} \sim N(0,1)$, model (2.2) becomes a standard Probit model. However, the exogeneity of individual unemployment status is quite questionable due to following reasons. First, people who are unemployed may have less motivation and are more likely to live on benefits rather than to be a job-seeker. If that is the case, the unobservable factor has a positive correlation both with unemployment status and with welfare take-up, and it can induce an upward-bias of coefficients in the standard Probit model. Second, if one can easily access information regarding job-market and welfare application processes through the help of the community or coethnics, this unobserved factor "network", for example, can have a negative impact on unemployment status but positive impact on welfare take-up, generating a negative relation between unemployment status and welfare take-up. If this is the case, the coefficient from standard Probit model will be downward biased.

In any case, it is hard to make the assumption that individual unemployment status is exogenous to claiming benefits. Because of the endogeneity in a model biases coefficients of all variables, an instrumental variable is introduced here to find a more reliable effect of immigrant status on welfare take-up. Rewriting the equation (2.2) with an assumption that the error term is distributed as jointly normal with correlation ρ between the error terms, the model can be expressed as (2.4),

• Instrumental variable Probit estimation

$$
\begin{aligned}
y_{it} = \mathbf{1}(y_{it}^* > 0) &= \mathbf{1}(\alpha_0 + \delta_0 I_{it} + \delta_1 U_{it} + x_{it}'\beta + \epsilon_{it} \geq 0) \\
U_{it} &= \gamma_0 + \gamma_1 I_{it} + \gamma_2 Z_{it} + x_{it}'\gamma_3 + u_{it} \\
&(\epsilon_{it}, u_{it}) \sim N(0, \Sigma)
\end{aligned}
\tag{2.4}
$$

The notation is the same as described beforehand except that the unemployment status is identified by an instrumental variable from now. Based on the specification (2.2), Individual eligibility status is chosen as an instrumental variable Z_{it}. This variable is counterfactually derived from simulation based on SGB II, which specifies who is entitled to benefits and how much they can receive if they are. The derivation of eligibility status is shown in next section in detail.

When a coefficient of immigrant status is found positive and significant from the estimations, it suggests that immigrant status is a factor that increases one's dependency on the benefits. If it shows no significant effect, however, it can be interpreted that the disproportionately higher participation of immigrants among welfare recipients, shown in the data description, is mainly driven by their socio-economic characteristics, not immigrant status.

Tab. 2.3: Mean and Standard deviation of characteristics of Natives and Immigrants

	Natives		1st generation Immigrants		2nd generation Immigrants	
	Mean	Std.Dev	Mean	Std.Dev	Mean	Std.Dev
Number of household	2.48	1.17	2.90	1.22	2.41	1.15
Number of children	0.52	0.78	0.75	0.86	0.64	0.84
HH: Single children	0.05	0.22	0.02	0.13	0.06	0.25
HH: Married children	0.23	0.42	0.37	0.48	0.30	0.46
HH: Single no child	0.25	0.43	0.11	0.31	0.33	0.47
HH: Other Type	0.19	0.39	0.22	0.42	0.16	0.36
Married	0.51	0.50	0.65	0.48	0.45	0.50
Age	42.88	10.42	43.51	10.13	35.51	8.92
Gender (1: *Female*)	0.45	0.50	0.41	0.49	0.48	0.50
Health (5: *Very bad*)	2.42	0.90	2.47	1.03	2.29	0.89
Region (1: *West*)	0.70	0.45	0.97	0.16	0.90	0.29
Years in Education	12.62	3.49	11.20	3.47	11.93	4.01
Unemployed	0.07	0.25	0.11	0.31	0.07	0.26
Years in fulltime	16.42	11.30	16.75	11.37	9.81	8.80
Years since migration	0.00	0.00	23.43	11.73	0.00	0.00
Language (1: *Good*)	1.00	0.00	0.38	0.49	0.76	0.43
Turkish	0.00	0.00	0.16	0.36	0.00	0.00
Central Europe	0.00	0.00	0.29	0.46	0.00	0.00
East Europe	0.00	0.00	0.01	0.09	0.00	0.00
Number of observations	19917		2119		1291	

SOEP data 2007-2010, pwmean- pairwise comparison in mean between groups that showed significance in differences. Health and language ability variables are scaled from 1 (very good) to 5 (bad), weighted.

Means and standard deviations of all variables used in estimations are described in Table 3.3. According to Table 3.3, the first generation immigrant group has fewer years of education and a lower proportion of women than any other group. The first generation immigrant group is slightly older than other groups probably because many of them entered Germany as guest workers in the 1970's. On the other hand, second generation immigrants are younger than any other group on average, but the mean of their number of children is higher than that of native households. The first generation immigrant group has more children than other groups, and they are more likely to be married than natives and second generation immigrants are.

Health status is also considered as a covariate in the model. The smaller value indicates the better health status, scaled from *1 (Very good)* to *5 (Bad)*. Second generation immigrants have the lowest health scale, which is probably due to their younger age. In the estimation, it is expected that higher health scales are related to the higher take-up rate because people in bad health are presumed to have less capability of working. The region variable is also included to control the regional difference between Western and Eastern Germany. In data, more than 90 percent of first and second generation immigrants reside in West Germany due to historical and economical reasons.

The proportion of the unemployed is greatest for first generation immigrants. The 'years-in-fulltime' variable is added as a control to account for the effect of working experience. It is expected that the take-up rate has a highly significant relation with unemployment status. And the rate decreases as a person has more working experiences. The average years in fulltime working experience is slightly higher for first generation immigrants, reflecting the fact that many of them came to Germany as guest workers and have more experience in work since then. The fact that first generation immigrants have a longer working experience but are likely to be in the unemployment suggests that many of them might have failed to get re-employed or have retired earlier. Much shorter experiences in the work of second generation immigrants reflect their younger age.

Language ability is also taken into account in the model. In SOEP data, German writing and speaking skills of immigrants are scaled from 1 *(Very bad)* to 5 *(Very good)* based on the subjective evaluation of their own German language ability. The language ability in Table 3.3 is the mean value of writing and speaking scales. The language variable is coded as 1 if the average value is above 2, indicating "Good in German" and 0 otherwise. For comparison with natives in estimations, the language skill of natives is filled with value 1. Observed language skills of first generation immigrants are lower than that of second generation immigrants, suggesting that second generation immigrants are better-integrated than their previous generation in terms

of language proficiency.

The variable 'years since migration' is added as a control, too. This variable can answer a question of whether immigrants in Germany tend to assimilate into or out of welfare programs, as their duration of stay in Germany becomes longer. Using U.S. data, Borjas and Trejo (1992) found that the process of assimilation leads immigrants into the welfare system rather than out of it because assimilation involves the accumulation of information not only about labor market opportunities, but also about alternative opportunities available through the welfare system. This argument presumes that immigrants will take advantage in the information of welfare use rather than job-search as their network in the host country broadens. However, if immigrants could integrate into the labor market well, they will make the best use of networks and information in the way of assimilating out of welfare programs. So far, it is not found yet in which direction immigrants are assimilated in Germany regarding welfare take-up, according to the literature discussed in previous sections. Thus, the effect of this variable is not clear-cut and will be examined through estimation.

Apodictically, immigrants consist of heterogeneous people depending on the country of origin, the time they entered, the purpose they came to Germany, *etc*. To see how immigrant's regional variety of origin affects welfare take-up differently, regional dummies indicating Turkey, Central Europe, and Eastern Europe[23] are added in the estimation. These regions are chosen as immigrants from those countries, that are getting especially more attention when it comes to debates over the welfare use of immigrants, and these groups take the largest proportion of immigrants as a whole in SOEP data. This information is only available for the first generation immigrant group.

2.3.3 Instrumental variables

Though observable characteristics relevant to take-up behavior are taken into account in the model, it is not possible to completely exclude the role of unobservable factors which can cause biased estimators. As described in the previous section, the individual unemployment status is likely to be governed by unobservable factors which also influence take-up behavior. For example, less motivation, a passive attitude and insensitivity of being stigmatized are all such factors which lead individuals to stay in unemployment and choose to take up benefits.

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[23] This categorizing follows Riphahns (2013). Central Europe includes Albania, Bosnia Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia, Poland, Romania, Slovakia, and Slovenia. Eastern Europe is taken from the country of origin variable which is named collectively "Eastern Europe".

For this reason, this research adopts an instrumental variable 'Individual eligibility status' in the model, which is counterfactually derived. The term 'counterfactual' is emphasized describing the eligibility status here to point out that this status is not assigned to people explicitly and it is not automatically notified to them either. Eligibility status is a dummy variable that indicates whether a person is eligible for the benefit or not, based on simulation results. Note that there are two conditions required for the validity of an instrumental variable: 1) *Relevance to endogenous variable*, which is the unemployment status in this case, and 2) *Exclusion restriction*, $Cov(Z_{it}, \epsilon_{it}) = 0$, which guarantees exogeneity of an instrumental variable in the model.

1) Relevance to unemployment status: Eligible status (coded as 0 or 1) is assigned to each person counterfactually through the simulation because it is neither observed in data nor labeled automatically. It is derived from a function of various factors such as household composition, household income, asset level and regions they live in. Though unemployment status is not directly linked to eligibility status, it is reliable that people in the eligible situation are less likely to be in work or be eager to find a job as they can claim the benefits if they desire. The simple correlation coefficient between eligibility status and unemployment status is around 0.67, which is pretty high enough to believe their strong relevance. To confirm this relevance, F-statistics on the excluded instruments in the first-stage regression will be examined after running the estimation with the instrumental variable in next section. This is an important restriction as the weak relevance between two variables induces biased estimators, which may distort the result more severely than when it is run with the endogeneity issue in the standard probit estimation.

2) Exclusion restriction: Eligibility status is decided by the legal description (SGB II), and becoming eligible is much less manipulative for an individual than being in unemployment to take up benefits. For example, it is unreasonable to assume that either - one forms a large family to be entitled to the benefit or intentionally takes low-paid jobs[24]. Compared to eligibility status, in this perspective, individual unemployment status is certainly more at an individuals voluntary range and easy to play a role in the estimation endogenously. Note that eligibility status is counterfactually derived. Thus, an individual has no information about his eligible status, and its eligibility is relying on government's policy regulation exogenously. However, this second assumption is not testable because this case is just-identified[25].

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[24] This paper does not consider the case where people misreport their household composition to exploit the benefit system and the case where people attempt to work less due to lack of incentive brought by this benefit system.

[25] Some other instrumental variables are suggested to make over-identification feasible e.g., Regional unemployment rate. However, a weak instrument problem arises with additional IV and bias induced by this can be severe. (Angrist, J. D., & Pischke, J. (2009), Mostly Harmless Econometrics) The bias in the IV model is an increasing function of the number of instruments, so the bias is least in the just-identified case when the number of instruments

Fig. 2.1: Flow Chart of Eligibility Status
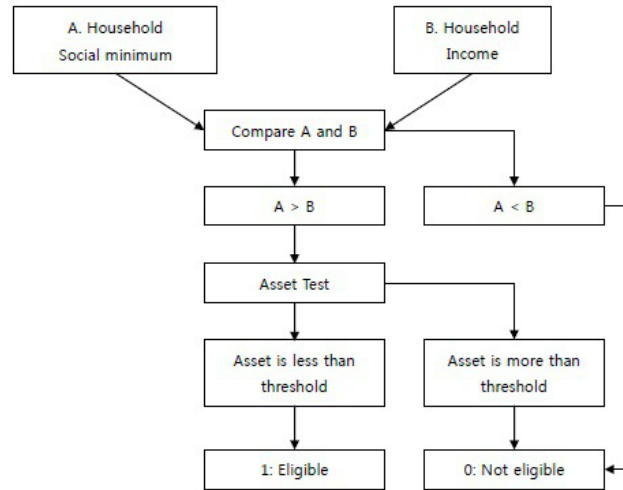
Instrumental variable: Eligibility Status

This section addresses how eligibility status is assigned to each household. This process is in line with studies of Frick (2007), Castronova *et al.*(2001) and Bruckmeier and Wiemers (2011) in a sense that they also derived eligible status following the stipulation provided by the government. Although this process seems to require some complex procedures, it is known that determining an eligible status is much easier under the welfare system in Germany than those in any other countries, especially the United States[26].

As a first step, the amount of social minimum at the household level is calculated. Second, the social minimum of each household will be compared with household income, and the eligibility status is assigned to the household *(Coded 1)* if their income does not reach household social minimum level. Third, the amount of household wealth is examined because a person who wants to claim unemployment benefit II is required to use up their available assets to a certain threshold. This restriction on wealth is based on the perception that the means-tested income support should be granted only if the person or household is not able to cover his needs by own financial resources. Figure 2.1 visually describes this process.

According to the SGB II, unemployment benefit II (Hartz IV) specifies the standard payments as 345 Euros for a single or single parent in Western Germany and 331 Euros in East Germany.

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is as low as it can get.

[26] Castronova *et al.*(2001)

Tab. 2.4: Unemployment Benefit II: Lump sum Standard Payment (SP)

	Single or Single parent	Other Household Members		
		Children up to 14 years old	Children aged between 15 and 18	Adults, 19 yrs of age and above)
	100% SP	60% SP	80% SP	90% SP
Western Germany including Berlin	EUR 345	EUR 207	EUR 276	EUR 311
Eastern Germany	EUR 331	EUR 199	EUR 265	EUR 298

Additionally per household:
• Transfer for lodging and heating
• (If the preconditions are fulfilled), a limited additional payment of up to EUR 160 for gainfully employd individuals and for their partners and up to EUR 60 for each child
• Contributions to compulsory social insurance (health, nursing care and old age)

Source: *Bundesministerium fur Wirtschaft und Arbeit* (2004)

For children, the standard payments are lower than those of adults, and it varies with respect to the age of children. Table 2.4 describes the amount of benefits settled in 2004 ahead of the reform. In detail, the full standard rate is granted for a single or single parent adult and the amount is adjusted depending on the age of household members. Because the household social minimum is derived as a sum of the standard benefit of each household member, an additional person in a household means more benefits that a household can claim.

Throughout the observation years, there have been slight changes in the standard rate in the calculation. Those changes are accounted for in the analysis[27]. In addition, there was a gap in the amount of benefits between Western and Eastern Germany in the earlier version of this benefit system. Because this differential was abolished in 2007, this gap was not considered in this research.

Adding to the sum of household member's standard rate, costs of housing and heating are also included within the household social minimum. Concerning housing costs, actual expenses are borne by the competent administration if their amount can be considered to be "appropri-

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[27] Since 1st January 2012, the standard payment is EUR 374 for all of Germany. The normal requirement for adult partners is EUR 337. Children younger than 6 years receive EUR 219. Between 6 and including 13 years of age this is EUR 251. Children and young person between 14 and 17 years receive EUR 287. For young adults from 15 years on and below 25 years who live with their parents or who moved without the positive assertion of the municipal authority, this is EUR 299. (www.arbeitsagentur.de)

ate" (§22 SGB II)[28]. This housing cost is not only applied to tenants but also to house owners. Though there are actual housing costs observed in the GSOEP separately for tenants and for owner-occupiers, this paper adopts a guideline from the Munich Government in 2006[29] in calculation due to a lot of missing values of this variable.

The following Table 2.5 describes the upper limit of housing support provided by the guidelines. As shown, the amount of benefits varies depending upon the number of household members and the size of the apartment. This criterion is applied in the calculation. Also, the allowance of housing costs is broadly applied here, assuming that recipients are able to claim the maximum amount of housing costs introduced in the table. In practice, however, the family claiming housing support can be asked to reduce housing costs either by subletting living space or by moving to a flat with more appropriate costs. In case recipients are the owner of their house or apartment, the amount of housing cost (including interest, but excluding repayment) is also covered up to a certain amount, and the SA (Social Assistance) agency might request that claimants sell the house in cases of housing costs exceeding this amount. However, the definition of the 'certain amount' or 'appropriate amount' of housing costs is largely at the discretion of SA agency[30] thus the calculation may be not accurate in some cases. Therefore, to apply the housing rule fairly to tenants and homeowners, the standard case applied to tenants is also applied to the homeowner case.

Household Income: So far, the "Household needs" - or a social minimum- were considered as a sum of the standard payment of each household member and housing costs. To define eligibility, this need should be compared with household income. The income measure used for this comparison is 'household net income', which is adjusted with deductions of taxes and social security.

Wealth Checks: After this comparison between needs and income, household wealth checks follow to determine households that can cover their expenses with their own assets. This procedure, called 'means-test', is based on the idea that tax-based income support should function as the last safety net for households in need. In detail, household wealth is allowed to be kept only up to a certain amount, and a person is not entitled to the benefit if their asset exceeds this

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[28] Anne K. Zimmer (2010)

[29] Questions and Answers on Hartz IV in Munich. (n.d.). from http://www.auslaenderbeirat-muenchen.de/publi/hartz/Hartz_englisch.pdf

[30] Joachim R. Frick and Olaf Groh-Samberg (2007) - Before the reform, SA(Social Assistance) could be claimed at SA offices, which acted on behalf of the German municipalities. After reform, the former UA(Unemployment Assistance) and SA were combined to the new SA for needy employable people. Therefore, UB II claimants claim the benefits to SA offices. These SA offices will be written as a local job center, local agency, local offices or SA office depending on the context.

Tab. 2.5: Upper Rent Limits in Calculation

		Upper Rent Limits	
Number of Persons	Apartment size	Max. m^2 price	Upper rent limit including heating and warm water
1	20∼45	13.50	429.50
2	35∼60	12.40	644.30
3	50∼75	11.30	760.80
4	65∼90	10.80	837.50
5	80∼100	10.80	907.30
6	95∼110	11.00	1,012.00
7	110∼135	10.23	1,063.49

Source: Questions and Answers on Hartz IV in Munich 2004, The amount of housing costs are sub-divided according to building age class. Due to the lack of information on building class in data, I took the highest amount. Upper limits of hosing support here are the sum of pure rent, additional costs, heating and warm water.

threshold.

Considered as wealth are generally all types of property which belong to the household members and which could be exploited economically. Exemption refers to financial wealth only. First, the basic personal exemption is allowed for each household member. The amount of exemption varies depending on member's age. Allowances are 200 Euros per year of age up to 13,000 Euros and a minimum amount of 4,100 Euros[31]. Adding to that, general savings up to 750 Euros are granted to every household member additionally. The amount of protected life insurance is more or less same to the amount above, thus life insurance must always be used up if the re-purchase price exceeds the previously mentioned asset limits. Life insurance can be protected as an old age pension scheme within this asset allowance if the utilization of the life insurance before going into retirement is contractually excluded by a restriction notice. However, in practice, it seems that life insurance is flexibly exempt from eligibility criteria. For example, in a case of hardship, the life insurance remained protected, and people in need are able to claim benefits. This flexibility is found in the data as well. For instance, the average amount of life insurance among the actual recipients in the SOEP data is over 8,000 Euros and its maximum value even reaches 15,000 Euros. Thus, applying the rule of life insurance too strictly reduces the number of eligible cases dramatically, and widens the gap between the number of actual recipients in data and that of simulated recipients in this process. Therefore, life-insurance is not taken into account as wealth in the main estimation but only considered in robustness checks

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[31] For people who were born before January 1st, 1948 a different exemption rule applies amounting the 520 Euros per year of age limited to an upper ceiling of 33,400 Euros. This is accounted for in the simulation.

Tab. 2.6: Eligibility by Immigrant Status and Household Types

	Natives	1st generation Immigrants	2nd generation Immigrants
Single w/o children	0.198	0.321	0.231
Single with children	0.387	0.568	0.455
Couples w/o children	0.132	0.170	0.113
Couples with children	0.151	0.284	0.301
Other type	0.201	0.255	0.151

Source: GSOEP 2007-2010, Eligibility is calculated as the division of the number of people who are eligible by total number of observation in each group. Other type is a type reporting single but living with other people not regarded as a partner or child.

Tab. 2.7: Unemployment rate by Immigrant Status and Household Types

	Natives	1st generation Immigrants	2nd generation Immigrants
Single w/o children	0.093	0.209	0.102
Single with children	0.195	0.266	0.207
Couples w/o children	0.045	0.093	0.029
Couples with children	0.117	0.242	0.163
Other type	0.073	0.048	0.035

Source: GSOEP 2007-2010, Unemployment rate is calculated as the division of the number of people who are unemployed by total number of observation in each group. Other type is a type reporting single but living with other people not regarded as a partner or child.

additionally.

It is quite challenging to make wealth checks accurate here for several reasons. First, GOSEP data surveys asset information every five years, thus assets only in 2007 are available in our case. Therefore, missing asset information in the remaining years is replaced with asset values collected in 2007. It can be problematic when an individual's wealth varied substantially during observed years. Moreover, it may under or overestimate the size of the eligible sample depending on the extent to which it changes. Second, old-age-provision is disregarded as it is not feasible to distinguish them from other assets in SOEP data. Exclusion of this asset would make this wealth-check too restrictive[32]. Third, the interpretation and actual implementation of regulations in SGB II are largely at the discretion of the competent local job center. Depending on how broadly they interpret the regulation based on the individual case, the possibility of passing the wealth check varies as well. Fourth, there is always a room for an individual to misreport their wealth for several reasons. Taking these drawbacks into account, the simulation proceeded. The results presented in Table 2.6 show the eligibility status by immigrant status and household type.

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[32] Bruckmeier and Wiemers (2011)

According to the table, the single-with-children household type is the most likely to be in the eligible situation regardless of immigrant status, whereas the couples-without-children household type has the lowest proportion of eligible households. It suggests that households having an additional dependent member i.e a child, are more likely to be in eligible situations. Also, the first generation immigrant group shows the highest proportion of eligible cases regardless of the type of household. Results from this table are similar to those from Table 2.7, which presents the unemployment rate by household type and immigrant status. It implies that there can be a strong relationship between an individual's eligibility status and unemployment status. For example, a person who has an eligible case may claim benefits and choose to be unemployed. Or, the unemployed individual is more likely to be in the eligible case due to lack of income, although the unemployment status is not a prerequisite condition to be entitled to the benefit.

Meanwhile, there is no credible measure to test the validity of simulated eligibility yet as it is not something reported in data. As an alternative way, 'beta-error[33]' seems to have been used in some literatures. 'Beta-error' refers to the cases reporting to be ineligible for benefits but receiving benefits in the data, and is defined as the proportion of a number of people who are ineligible but take up benefits to the total number of people who take up benefits. Although the size of this error is not ignorable in practice, it has been not covered in many studies so far. Frick *et al.* (2007) found that the size of this error varies between 0.190 and 0.380 depending on the extent of restriction they impose on the eligibility process. For example, when the restrictive asset check is applied, people are more likely to fall under the ineligible cases, and that increases the size of beta-errors. Automatically, this stricter restriction decreases the number of 'eligible but non take-up' cases as the restriction decreases the pool of eligible individuals.

This increase in the number of 'eligible but non take-up' cases also indicates a miscalculation. And a number of these cases moves negatively with the number of beta-error cases, rather like a 'trade-off' relation. Namely, the increase *(decrease)* of beta-error is linked to the decrease *(increase)* in number of non take-up cases. Thus, compromising the appropriate size of beta-error at a certain level is inevitable. The size of the beta-error from my simulation amounts to 20.6 percent, which is somewhat moderate compared to earlier findings. Reasons that these errors are present in this process are highlighted below.

1) Again, the appropriateness of asset and income level is largely at the discretion of the local job center. 2) Possibly, people may misreport their asset level to the local agency differently from

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[33] Term 'beta-error' is used in Frick and Groh-Samberg (2007) for the first time from authors knowledge. Despite its name, it has no relevance to statistical errors. This error is calculated as Beta-error = Number of households (take-up=1 and ineligible=1)/number of households (take-up=1)

one that they responded in the SOEP surveys. This is plausible if individuals are attempting to exploit the benefit system, which cannot be reflected in our simulation. 3) A 'needs unit' is often misreported by people, intentionally or not, resulting in inaccuracies. A needs unit of a person corresponds to all members of that unit budgeting jointly and living in a same household[34].

So far, the 'needs-unit' is not explicitly referenced because the typical household types defined in this study are mostly identical with needs unit of individuals in the data. However, there are some cases where separate needs units are formed by children of the person in need who are older than 25 years but still live in the same household or who are younger but already have their own children. Theoretically, they are in a separate needs unit although they live in the same household, thus should be able to claim benefits regardless of income or wealth of members in different needs unit. However, it is not clear in the SOEP data how much contribution each household member made to household income or household wealth, which makes analysis based on the needs unit barely feasible. Fortunately, this case is very rare in the data used, thus they are counted as the same needs unit - for example, a child aged over 25 is still in the same needs unit with their parents in this study. 'The other type' households mentioned in Table 2.1 mostly consist of co-residence of more than two adults who have no family relations to each other and whose information about any family relation is missing in the data. This remains in a grey area and had to be considered as the same unit as well. In practice, the burden of proof regarding 'needs unit' is on claimants, not on the local agency. Thus it is also likely that people may misreport their needs unit to be entitled to the benefit. That can be another reason generating a mismatch between the eligible cases from simulation and those from actual recipients in the data.

2.4   Results

2.4.1   Main results

Table 2.8 shows the result of estimation (2.1) - (2.3), which are presented in column (1)-(3). All of them are reported in marginal effects[35]. The first and second columns present the results of the panel probit model for both cases of unconditional and conditional dependence on individual unemployment status respectively. Except that the size of the effects becomes smaller when unemployment status is taken into account in the specification (2), the signs and significance of

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[34] Anna K. Zimmer (2010)
[35] Average marginal effects

variables more or less remain unchanged.

According to this table, an additional household member in a household reduces the likelihood of taking-up benefits whereas the increase in the number of children is related to a higher probability of living on benefits. It is reliable in a sense that an additional adult member of a household can contribute to the financial resource of households whereas children can be a burden to a household. These findings are consistent with those from Table 2.2. This interpretation is reassured as the single household with children is significantly more likely to take up benefits than any other household types are, and married couples with children are less likely to do so. The single-without-children type shows no significant relation with take-up behavior. The other household type is also likely to claim benefits than other types, but it is hard to make a conclusion because the composition of "other household type" is not homogenous in data.

The impact of 'age' is not significant in both column (1) and (2) although its sign is negative. A variable 'age squared' shows a positive and significant effect, suggesting that the effect of age becomes stronger as it increases. When other conditions are equal, females are less likely to take up benefits than their male counterpart. An individuals health status is negatively related to take-up behavior in both specifications, and divorce status has no effect on benefit take-up. As expected, people who are more educated and have longer experiences in the job market are less likely to take up the benefits. People who live in Western Germany are 4.7 percentage point less likely to take up benefits compared to their Eastern counterpart, probably due to better economic situations in Western Germany.

In both specifications (1) and (2), it is observed that the effect of first generation immigrant status is positive and significant. This finding is quite a contrast to the results of Riphahn and Wunder (2012) in which the effect of immigrant status on take-up was found to be insignificant. Because the details of specification and observation years used here are different from those used in Riphahn and Wunder (2012), their result could be confirmed only when 'years in unemployment' is included into the current specification as was done in their work. However, this variable is excluded in this case for following reasons. First, this variable flips the sign of immigrant status and other co-variables in the model, which is possibly caused by a multicollinearity problem. Second, this variable has a strong correlation with 'years in full-time jobs', which measures one's working experience in the model. Third, it may cause a simultaneous problem as people who currently take up benefits are likely to stay longer in unemployment.

In the unconditional case, the result shows that first generation immigrants are 15 percentage points more likely to take up the benefits than natives are. The size of the effect is quite large,

VARIABLE	(1) Probit 1	(2) Probit 2	(3) IV Probit
Number of household member	-0.00795***	-0.00611***	-0.000640
	(0.00178)	(0.00175)	(0.00181)
Number of Children	0.0192***	0.0153***	0.00201
	(0.00273)	(0.00240)	(0.00253)
Single with children	0.0327***	0.0295***	0.0118*
	(0.00605)	(0.00638)	(0.00644)
Married with children	-0.0122**	-0.0107**	-0.00485
	(0.00482)	(0.00538)	(0.00523)
Single without children	0.00385	0.00522	0.00563
	(0.00472)	(0.00511)	(0.00462)
Other household type	0.0176***	0.0177***	0.0153**
	(0.00554)	(0.00676)	(0.00609)
Age	-0.000423	-0.000415	0.00293***
	(0.000982)	(0.000977)	(0.00104)
Age squared	0.000378***	0.000203*	-0.000322**
	(0.000119)	(0.000113)	(0.000125)
Sex (*Female 1*)	-0.0110***	-0.00680*	0.00315
	(0.00313)	(0.00369)	(0.00272)
Health (*Very bad 5*)	0.00810***	0.00718***	0.000248
	(0.00121)	(0.00148)	(0.00148)
Divorced	0.000482	-0.00145	-0.00656
	(0.00473)	(0.00619)	(0.00561)
Years in education	-0.00530***	-0.00430***	-0.00115***
	(0.000514)	(0.000358)	(0.000315)
Region (*West 1*)	-0.0470***	-0.0382***	-0.0116***
	(0.00435)	(0.00323)	(0.00278)
Yrs in fulltime work	-0.00361***	-0.00288***	-0.000528***
	(0.000332)	(0.000269)	(0.000198)
1st generation Immigrants	0.159***	0.0998**	0.0328
	(0.0553)	(0.0402)	(0.0221)
2nd generation Immigrants	0.00599	0.00540	0.00405
	(0.00713)	(0.00621)	(0.00556)
Years since migration	-0.00415***	-0.00366***	-0.00169
	(0.00116)	(0.00131)	(0.00124)
Years since migration square	0.000737***	0.000656**	0.000373
	(0.000224)	0.000225	(0.000236)
Language (*Good 1*)	-0.0114	-0.00360	0.0109
	(0.00705)	(0.00755)	(0.00679)
Turkish	0.0324***	0.0263**	0.00606
	(0.0104)	(0.0106)	(0.0108)
Central European	-0.0126	-0.0113	-0.00216
	(0.00943)	(0.0108)	(0.00930)
Eastern European	-0.264***	-0.304***	
	(0.0457)	(0.0700)	
Unemployed		0.0910***	0.356***
		(0.00267)	(0.0197)
Number of Observations	20,168	20,033	20,016

Note: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1 Average marginal effects are shown in (1)-(4). dy/dx for factor levels is the discrete change from the base level. The bootstrap standard error was calculated in all regressions. The variable 'Married without children' household type is dropped due to collinearity. The variable 'Eastern Europe' is dropped in estimation (3) as all of its few observation (17) falls into employment status.

given that the take-up rate of each group is in a range between 10 and 20 percent, and even a variable 'the region', which shows the highest effect in the table, increases the likelihood only around 4.7 percentage points. In the conditional case in column (2), the impact of first generation immigrant status is reduced considerably. With a relatively slight decrease in the size of other coefficients in the model, the coefficient of the first generation immigrant is now only 9.9. Certainly, this decrease in the size of the coefficient is derived by the inclusion of individual unemployment status, which suggests that the strong effect of immigrant status on benefit take-up comes from their unemployment status to a large extent.

The variable 'second generation immigrants' shows no evidence of welfare dependency of this group in any case, although a small number of observations requires a cautious interpretation. According to the coefficient of 'years-since-migration', it turns out that the longer one stays in Germany, the less he/she is likely to take up the benefit. This result indicates that there is an assimilation out of the welfare program in Germany, which is a contrast to findings in the U.S. analyzed by Borjas and Hilton (1996). The squared term of 'years-since-migration' shows a positive sign, indicating that this effect of duration of stays on the take-up decision becomes stronger as one stays longer in Germany. The language variable shows no impact at all here. Regional difference of immigrants in take-up behavior is notable. According to the result, immigrants from Turkey are more likely, and those from Eastern Europe are less likely to take up benefits when other variables are controlled for in the model.

The effect of individual unemployment status on welfare take-up in column (2) is strong and positive, suggesting that people in unemployment are 9.1 percentage points more likely to take up benefits than people who are not. Given that the coefficient of unemployment status can be interpreted as a take-up rate among the unemployed when other covariates are controlled, the magnitude of the estimator seems considerably low.

Estimation with an Instrumental Variable

The presence of endogeneity in a model induces biases of all estimators. Thus, the instrumental variable probit model-referred to as 'IV probit'-[36] is estimated and presented in column (3) to address this issue. The estimated correlation coefficient between the error terms ϵ_{it} and u_{it} is $\rho = -0.727$ in the IV probit with a robust standard error of 0.0157, suggesting that there is a negative relationship between an unobservable factor which determines the probability of

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[36] Due to the fact that STATA does not provide code for endogenous panel probit model at the moment, the probit model was estimated without consideration of panel structure of data.

claiming Hartz IV and another unobservable factor which determines individual unemployment status. The result of Wald test, which is not reported here, rejects the null hypothesis of 'no endogeneity' at a 1 percent significance level. It supports the initial idea that the standard probit regressions in column (1) and (2) are not appropriate due to endogeneity problem in this case.

According to the result table, the effects of many variables are not significant anymore, and even their signs become flipped when the instrumented individual unemployment status is taken into account in the model. The additional household member or child does not influence the probability of welfare take-up anymore. The single-with-children household type, which is deemed as financially the most vulnerable household type, is the only type which remains significant in the model (3). Notably, the effect of the age variable becomes positive and significant after endogeneity is adjusted for in the model. An additional one year of age increases an individuals likelihood of take-up benefits by around 0.3 percentage points according to the result. This effect of additional age becomes weakened as they become older. Now the effects of the sex and health variable are not significant although years in education and full-time work and the region of residence still play a significant role in take-up behavior.

Most importantly, the immigrant status does not show any significant influence on welfare take-up. Nor do immigrant specific variables. Note that the size of the effect of unemployment status is increased by large amount, suggesting that people in unemployment status are 35 percentage points more likely to take-up benefits than people who are not.

The result of first regression in Table 2.9 shows that those effects that covariates had on welfare take-up beforehand are now presented as the impact on individual unemployment status. All of the effects found in column (1) and (2) in Table 2.8 reappear significantly in the result of the first regression. The age variable gives a new perspective, indicating the younger individual is more likely to be unemployed. Divorce status is positively linked to unemployment status, and the effects of health status, sex, years in education and full-time work reappear here with the same signs.

Immigrant status is no exception in this reappearance. First generation immigrants are 9 percentage points more likely to be in unemployment than natives are, and the result is significant at 1 percent significance level. Immigrant-related variables are also highly related to individual unemployment status. For example, the longer one stays in Germany, the less likely he/she is unemployed, implying an assimilation into the labor-market of immigrants. It indicates that immigrants assimilate out of welfare-programs as their duration of stay in Germany become longer.

Tab. 2.9: The Result of First Regression

VARIABLE	(1) First regression
Number of household member	-0.0236***
	(0.00257)
Number of Children	0.0436***
	(0.00472)
Single with children	0.0501***
	(0.0131)
Married with children	-0.0212**
	(0.00732)
Single without children	0.00271
	(0.00597)
Other household type	0.00772
	(0.01042)
Age	-0.00349**
	(0.00167)
Age squared	0.000107***
	(0.0000193)
Sex (*Female 1*)	-0.0268***
	(0.00408)
Health (*Very bad 5*)	0.02686***
	(0.00241)
Divorced	0.0204*
	(0.0107)
Years in education	-0.00749***
	(0.000553)
Region (*West 1*)	-0.0678***
	(0.00435)
Years in fulltime work	-0.00577***
	(0.000332)
1st generation Immigrants	0.0913***
	(0.0315)
2nd generation Immigrants	0.0038
	(0.00886)
Years since migration	-0.00624**
	(0.00249)
Years since migration square	0.000106**
	(0.0000458)
Language (*Good 1*)	-0.0265**
	(0.0113)
Turkish	0.0452*
	(0.0235)
Central European	-0.0141
	(0.0148)
Eligibility	0.2465***
	(0.0074)
Number of Observations	20,168

Note: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

As expected, the instrumental variable 'individual eligibility status' also shows a strong and significant effect on the unemployment status, implying that people who are eligible for the benefit are more likely to stay in unemployment. There are two conditions to be fulfilled, for the chosen instrumental variable to be a good instrumental variable: 1) The relevance of instrumental variable to instrumented variable and 2) Exclusion assumption. Condition 1) is diagnosed through the partial F-statistics on the excluded instruments in the first-stage regression. The reported value is 667[37]and is high enough to reject the possibility of the weak-instrument problem. Condition 2) remains untested as the just-identified case is not testable.

Back to the correlation between ϵ_{it} and u_{it}, the negative relation of error terms indicates that the unobservable factor in equation (2.2) has an effect on welfare take-up behavior and individual unemployment status in the opposite direction. For example, if a person is more exposed to information about the job market and government schemes, it is likely that one who has the less likelihood of being unemployed is more likely to take-up benefits. This is related to the role of social networks in reducing the costs of participation in the welfare program. Previous studies by Borjas and Hilton (1996) showed that the benefits received by earlier immigrants influenced the types of benefits received by newly arrived immigrants from the same origin country, which induces speculation that there might be ethnic networks that transmitted information about the availability of particular benefits to new immigrants. This network effect has also positive aspects when it comes to labor-market outcomes.[38]

Unobservable personal traits such as an active attitude and less reluctance of being stigmatized for taking state benefits can also explain the negative correlation between error terms ϵ_{it} and u_{it}. For example, one who has an active personal trait is less likely to be unemployed and more actively to claim his benefit if he needs to do so. Furthermore, there is a growing field of behavioral economics which argues that a more accurate model needs to allow time inconsistency in a sense that people tend to put more weight on the present than on the future in making a decision[39]. As the cost of application for the benefit is at present but benefits are in the future, if one has a strong preference over present to future, he/she is less likely to take-up benefits. And they are also likely to be unemployed for leisure at present although it only applies to the voluntarily unemployed case. Details of the story of unobservable factors are left here for the future research, and this paper limits its conclusion as follows: Immigrant's reliance on welfare in data is actually drawn from their higher likelihood of being unemployed, rather than their

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[37] Stock, Wright, and Yogo (2002) suggest that F-statistics above 10 indicate there is not a weak instrument problem though it is not a proof.

[38] See Munschi (2003), Elliott (2001)

[39] O'Donoghue and Rabin (1999)

Fig. 2.2: A Gap in Probablity of Benefit take-up between Natives and First generation immigrants
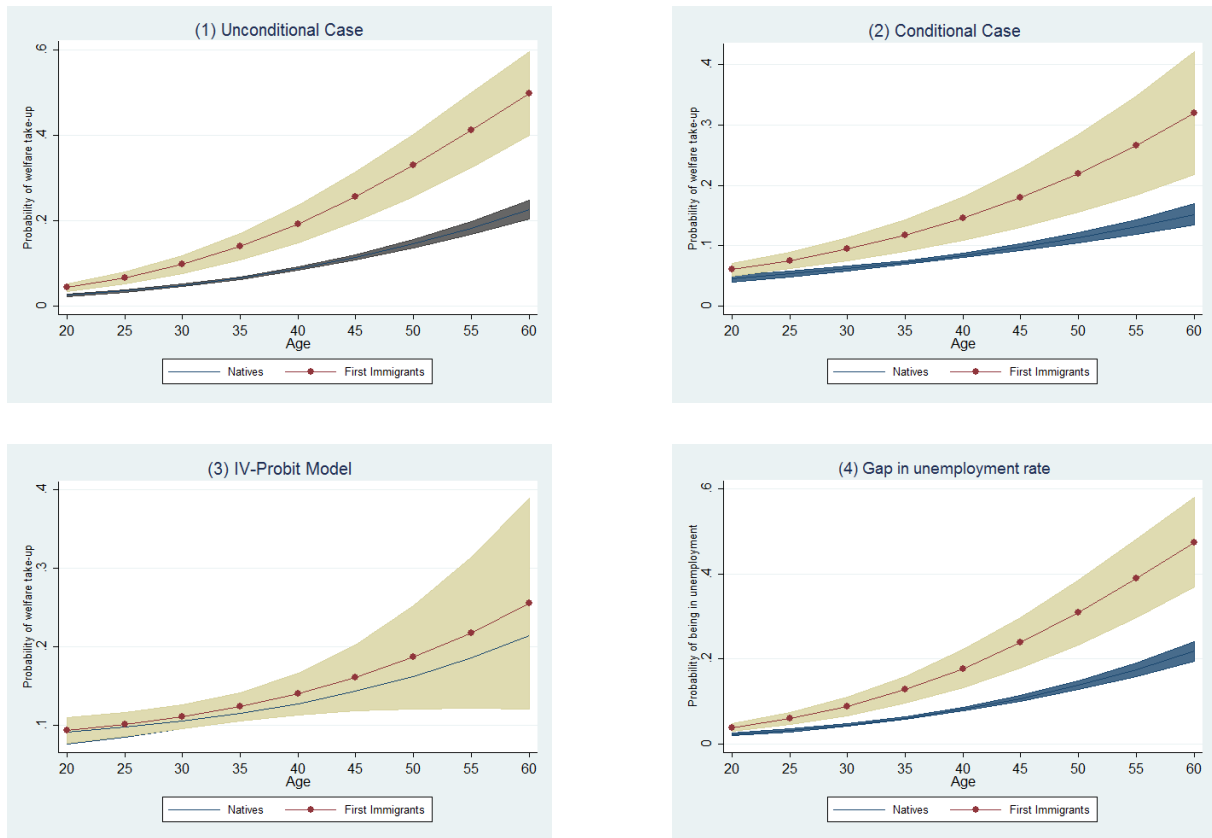
Source: SOEP data 2007-2010

immigrant status.

Figure 2.2[40] summarizes findings from the main estimations. First two panels (1) and (2) demonstrate the narrowed gap in welfare take-up between natives and first generation immigrants when unemployment status is taken into account as (2). Note that the welfare take-up rate is higher for first generation immigrants than natives in any age range. The gap between two groups becomes wider as age increases. This gap between two groups is barely visible in (3) when the endogeneity issue is addressed and the adjusted effect of immigrant status is depicted. The last panel describes the probability of being unemploymed of natives and first

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[40] The predicted margins of welfare take-up by age and immigrant status. Additional estimations were run adding interaction terms of age and immigrant status, to describe how the change of the gap between two groups varies as age increases. Panel (3) is derived from the instrumental variable probit model, and the y-axis is presented as the probability of positive outcome to avoid a minus result from the fitted value. Panel (4) is derived from the first regression, also rerun to show the interaction effect of immigrant status and age. In all cases, second generation immigrant was dropped here due to lack of observations.

generation immigrants. The gap between two groups and their curves are similar those in panel (1), which suggests a strong relationship between individual unemployment status and welfare take-up behavior. Although there is a covariance between the differences that we must consider to make a further statement, Figure 2.2 confirms findings that welfare take-up behavior of natives and immigrants has no difference after all, when other characteristics are properly taken into account.

2.4.2 Robustness Checks

This section checks the robustness of findings from the main estimation. First, the results of specifications from equation (2.2) and (2.3) were reported in column (1) and (2) respectively in Table 2.10, taking the only first generation immigrant group into account. The first column is the result of a probit model, which presents a significant impact of immigrant status on welfare take-up. The result in column (2) reassures that this effect of immigrant status does not exist anymore when endogeneity issue is resolved. The rest of the variables give similar implications as earlier findings.

Column (3) is the result of a probit estimation with the instrumental variable taken into account. Eligibility status in this specification was constructed using stricter rules in applying a means-test, by taking life-insurance as counted assets. As people who hold life insurance more than 13,000 Euros are not protected under this newly imposed restriction, it reduces the number of people who are eligible for this benefit by more than 3,000. However, the core result of estimation remains unchanged, indicating the main result is robust against the scope of eligibility to some extent. The last column uses the regional unemployment rate as an additional instrumental variable in the first regression. The regional unemployment rate is calculated as the average value of the unemployment rate in each state in Germany. Taking an additional instrumental variable in the model makes a test of the exclusion assumption feasible although its result is not reported here. The result of the over-identification test with two instrumental variables meets the standard for a valid estimation. However, this specification was not considered in the main estimation due to the small variation of the regional unemployment rate and a potential endogeneity issue of the regional unemployment variable which is not testable individually in the model. With consistently derived results, however, this paper draws a final conclusion in the next section.

	(1)	(2)	(3)	(4)
VARIABLE	Probit	IV-Probit	IV-Probit	IV-Probit
Number of household member	-0.00615***	-0.000675	-0.00249	-0.000637
	(0.00188)	(0.00181)	(0.00170)	(0.00182)
Number of Children	0.0153***	0.00202	0.00653***	0.00189
	(0.00266)	(0.00253)	(0.00240)	(0.00254)
Single with children	0.0293***	0.0117*	0.0184***	0.0115*
	(0.00607)	(0.00645)	(0.00558)	(0.00648)
Married with children	-0.0107**	-0.00485	-0.00705	-0.00467
	(0.00528)	(0.00523)	(0.00483)	(0.00524)
Single without children	0.00503	0.00550	0.00812*	0.00531
	(0.00504)	(0.00462)	(0.00415)	(0.00464)
Other household type	0.0177***	0.0154**	0.0179***	0.0156**
	(0.00610)	(0.00609)	(0.00520)	(0.00610)
Age	0.000380	0.00291***	0.00247***	0.00293***
	(0.00103)	(0.00104)	(0.000916)	(0.00104)
Age squared	0.000205*	-0.000321**	-0.000198*	-0.000325***
	(0.000124)	(0.000125)	(0.000102)	(0.000126)
Sex (*Female 1*)	-0.00685**	0.00312	0.000832	0.00325
	(0.00308)	(0.00272)	(0.00244)	(0.00273)
Health (*Very bad 5*)	0.00715***	0.000201	0.00306**	0.000218
	(0.00125)	(0.00148)	(0.00138)	(0.00149)
Divorced	-0.00142	-0.00657	-0.00486	-0.00680
	(0.00542)	(0.00561)	(0.00465)	(0.00562)
Years in education	-0.00430***	-0.00115***	-0.00218***	-0.00110***
	(0.000393)	(0.000315)	(0.000305)	(0.000315)
Region (*West 1*)	-0.0379***	-0.0113***	-0.0194***	-0.0114***
	(0.00302)	(0.00277)	(0.00269)	(0.00278)
Years in full-time work	-0.00289***	-0.000529***	-0.00123***	-0.000512**
	(0.000230)	(0.000198)	(0.000203)	(0.000200)
1st generation Immigrants	0.0964***	0.0316	0.0317	0.0316
	(0.0366)	(0.0218)	(0.0235)	(0.0219)
Years since migration	-0.00371***	-0.00173	-0.00221**	-0.00173
	(0.00117)	(0.00125)	(0.00103)	(0.00125)
Years since migration square	0.000685***	0.000383	0.000442**	0.000381
	(0.000203)	(0.000273)	(0.0002)	(0.000237)
Language (*Good 1*)	-0.00547	0.00969	0.00622	0.00988
	(0.00692)	(0.00678)	(0.00599)	(0.00682)
Turkish	0.0258**	0.00569	0.00836	0.00567
	(0.0106)	(0.0109)	(0.00929)	(0.0109)
Central Europe	-0.0112	-0.00212	-0.00573	-0.00209
	(0.00954)	(0.00932)	(0.00809)	(0.00937)
Unemployed	0.0909***	0.356***	0.262***	0.359***
	(0.00275)	(0.0197)	(0.0218)	(0.0199)
Number of Observations	20,033	20,016	20,016	20,016

Tab. 2.10: Robustness Checks

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. Column (1) is panel probit model and (2) is instrumental probit model using the eligibility calculated in section 3) as an instrumental variable. Column (3) is also IV-probit estimation when the eligibility, instrumental variable, is strictly defined. Column (4) uses regional unemployment rate as an additional instrumental variable. The results of first regression of (2)-(4) are not reported here.

2.5 Conclusion

So far this paper examined whether an individual's immigrant status is related to the increase in the likelihood of Hartz IV take-up in Germany. As found in previous literatures, immigrants status shows no causal link to benefit take-up in my result. However, this paper is differentiated from earlier findings by pointing at individual unemployment status as a main path through which immigrants becomes recipients. Using counterfactual eligible status as an exogenous identification tool, this paper attempted to estimate bias-free coefficients of variables. When endogeneity of unemployment status is adjusted, it was found that immigrants are not more likely to take up benefits than natives.

The size of the coefficient of unemployment status in IV probit model amounts to 35.6, which is quite large, compared to results from Riphahn and Wunder (2012) which found its value close to 14. Although a direct comparison is not feasible due to the differences in data used and specification adopted, given that the coefficient of unemployment status on benefit take-up can be interpreted as a 'take-up rate' controlling for other covariates, the size of effect derived in this research is reliable. The results of the IV estimation indicate that a coefficient of individual unemployment status in the estimation with endogeneity would be downward-biased, suggesting that it is very likely that unobservable factors play a role and affect welfare take-up behavior and unemployment status simultaneously.

The fact that unobservable factors play a role gives some policy implications. For example, the negative correlation between error terms (ϵ_{it} and u_{it}) indicates that the moral hazard behavior of recipients, such as remaining unemployed to claim benefits, is not likely to be the case because the relation of the unobservable factor with unemployment status and the relation of the unobservable with welfare take-up moves in the opposite direction. The result rather suggests that people who are active in labor market are also more likely to take up the benefits because of their ability to access information, active attitude and personality, for example. Thus, helping foreign recipients rejoin the labor market will be a more effective policy to ease their welfare dependency.

The result in Table 2.9 supports this argument, showing that immigrants are more likely to be unemployed and they tend to assimilate out of unemployment as they stay longer in Germany. It implies that they are not likely to choose to be unemployed voluntarily. After all, "*They came to work and not to claim benefits*"[41]. Given that poor language skills increase the likelihood

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[41] Blanchflower and Lawton, 2008

of being in unemployment and that likelihood is reduced as their duration of stay in Germany increases, an intensive integration policy for immigrants will be essential.

Some argue that a selective system (Or Score system/Point system) should be considered at the very initial level of the immigration process because immigrants' disadvantageous socio-economic characteristics in the job-market drive them to end up in the welfare-trap. However, this system, which is currently adopted in Canada and Australia, is not compatible within current EU free movement rules at the moment[42]. Furthermore, a similar restriction on immigrants already exists for non-EU immigrants, as a so-called "*Blue-Card system*", which is designed to select high-skilled non-EU immigrant workers only. After all, the argument from proponents of a selection system is to expand the selecting system to EU citizens, altering the meaning of free-movement of persons, which is a fundamental right guaranteed by Treaty. Adopting this new idea will require in-depth consideration based on national consensus. Currently the German government have made its official stance on the issue that they support free movement of labor in the EU in response to rising debate in U.K where imposing stricter restrictions on foreign labors is getting more support from its citizens[43].

Besides, maintaining the stricter immigration policy overlooks more important issues such as the failure of integration policy, for example. As many researchers pointed out, the lower achievement of second generation immigrants in education and job-market is the evidence of the failure because their achievement is by large attached to the environment of their host country where they grew up in[44]. And the most important part of the integration policy is to take them into the labor market. If it is the unemployment status which induces the higher financial dependency of immigrants, the policy should focus on the reasons behind this situation which drive them into unemployment -*e.g* Discrimination, less motivation or less effective job training programs for the immigrant group. It is unfortunate that research so far has put more weight on immigrant behavior rather than structural changes in the host country[45].

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[42] Regarding non-EU immigrants, Germany already has functioning criteria in place - a "demand-oriented system- Blue Card system" that grants entry to applicants with a university degree and a job offer with a minimum salary depending on the field.

[43] On Thursday, June 23 in 2016, the people of Britain voted for a Brexit or a British exit, from the EU in a historic referendum.

[44] According to Hoßmann and Karsch (2011), the first pisa-findings showed Germany in international comparison to have poor performance of students with a migration background in school achievements. And one of every four second generation migrants does not have any type of professional degree in Germany.

[45] Thomas Liebig (2007) "Anti-discrimination measures have not been the main focus of integration policy in Germany, and there is currently no anti-discrimination law. This stands in marked contrast to the Nordic countries, but also to France, where anti-discrimination policy has been part of the formal integration framework. While much anecdotal evidence suggests that there is discrimination against immigrants in the German labor force, the precise extent of it is difficult to assess."

Lastly, it should be noted again that the data in this paper mostly covers immigrants who entered Germany around the 1970s-1990s. Thus, the external validity of this paper should be limited to a certain level because recent immigrants have different characteristics from those who entered in the past. For example, the composition of immigrants becomes more diverse as free-movement is being expanded across countries. Moreover, unlike guest workers in the 1970s-1980s, new immigrants enter Germany for various reasons, not only to seek work. The recent massive influx of Syrian refugees will obviously give different implications concerning these issues. This topic is not touched in this research as it was the recent outbreak and data is not available because of that. However, it is expected that a sizable new population in Germany will bring about changes in every aspect of society. It will also cause various disputes over the current welfare program and require further research in the future.

3. HOUSING COSTS AND HOUSEHOLD FORMATION AMONG YOUNG GERMANS

ABSTRACT

A growing number of young people continue to live at home, with serious implications for their independence.This chapter pays attention to the increase in housing costs as an important factor in this trend, and verifies the relationship between housing costs and move-out behavior of young Germans by modeling competing risks of a move-out event. In the results, I found housing costs have a significant effect on young people's decision on move-out from the parental nest. When the rent in the current county increases, it decreases the hazard of move-out for the young within the county given that the rents in other counties are fixed. On the other hand, the overall increase in housing costs (expressed as a *rent index*) in other counties also deters the young from leaving their parental home to live outside of their home county and additionally within. Also, this paper finds that family ties are an important concern for young Germans when they consider move-out, and current financial status is not particularly hindering them from doing so. Results are robust against various assumptions on baseline hazard function, but the significance of effects of housing costs on move-out behavior slightly varied depending upon the definition of movers when attrition occurs.

3.1 Introduction

Becoming an adult has been traditionally understood as comprising five core transitions – leaving home, completing school, entering the workforce, getting married and having children[1]. In many developed countries, however, the process of becoming an adult is more gradual and varied today than it was half a century ago. Younger generations stay in education longer than any generation in the past and it results in late entrance to the job market. Following the late completion of education and job stability, a marriage becomes a less important issue for younger generations. Marriage rates have fallen in all OECD countries over the period 1970-2014 and it has been accompanied by an increase in the average age at which first marriage occurs[2].

Likewise, today's adulthood is characterized by delayed family formation and late separation from parents, which is strongly relevant to the delayed residential independence of a younger generation. According to the background report based on OECD data[3], in most countries, young people are staying on longer in the parental home, particularly in southern Europe compared to the mid-1990s. The census report from U.S[4] in 2014 reports that in 1980, 22.9 percent of the total population aged 18 to 34 were living with a parent. This figure rose to 24.2 percent in 1990. It decreased to 23.2 percent in 2000 but rose again to its highest level recorded in the data to 30.3 percent in 2010. The situation in the UK is not so much different[5]. In 2013, over 3.3 million adults in the UK aged between 20 and 34 were living with a parent or parents. That is 24 percent of this age group and is 25 percent higher than that in 1996. Germany is not an exception to this issue. According to the report provided by Federal Statistical Office, in 1972, two out of ten of 25 years-olds in the former West Germany (including West Berlin) still lived with their parents. It is almost 40 percent in 2014, increased by a factor of two.

Delaying the onset of residential independence is a loss for young people and society, as the household is a basic social and economic unit, on which the foundations of civilization have been built. In addition, households are important consumers on the goods and services markets, they determine the housing market trends and form the social basis of our society. They provide a starting basis for projections in the business field and public administration, such as *e.g*

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[1] Sattersten and Ray(2010)

[2] OECD (2010a), OECD Family Database, OECD Publishing, Paris, http://www.oecd.org/els/social/family/database.

[3] Bowers, Sonnet and Bardone "Giving young people a good start: The experience of OECD countries"

[4] New ACS 5-Year Estimates: See How Young Adults Today Compare, from http://www.census.gov/newsroom/press-releases/2014/cb14-219.html

[5] UK Government Web Archive The National Archives, from http://www.ons.gov.uk/ons/rel/family-demography/young-adults-living-with-parents/2013/sty-young-adults.html

Projections of private demand for consumer durables, of the need for nursing care services and institutions as well as reliance on municipal services[6].

Then what is the reason behind the late formation of their own households for young people? According to the *Eurobarometer* survey, when asked why they thought young people were living at home with their parents longer than they used to, almost three-quarter of those aged 15-24 said the main reason was that they could not afford to move out. It is reasonable as young people are in education longer than people in the past, and less likely to have financial stability than any other age group due to less experience in the job market. Given that forming a household presumes residential relocation, accompanying extra housing costs, it is not surprising that young people find that living with parents is a more practical option.

In line with this concern, there have been researchers trying to figure out the link between housing costs and household formation of young people. Except for few cases, most of them pointed out their negative relationship using various methods and data[7]. Adding to these literatures, this paper attempts to verify the relation between housing costs and household formation of young people, particularly in Germany.

Starting the analysis, this paper clarifies the meaning of 'housing costs' as the rent or purchase price of a residential place per square meter. Depending on the context, the rent and purchase price is distinguished, but the rent is mainly emphasized here because young people are less likely to purchase their own property[8]. By 'young people', this research limits observations to those aged above 16 years old and less than 35 years old[9] because people in this age range are exposed to the risk of move-out from the parental home and expected to make a move-out decision independently.

'New households' can be formulated in various ways. However, this paper fixes the scope of interests to the case of move-out from parental house. 'Marriage' used to be the main reason for young people to move out from a parental home in the past or still is in some Asian countries. However, marriage is not the only living arrangement that young people in Germany leave their parental home for. They tend to enjoy prolonged youth living with friends, partner or being single for some time before they settle down in the form of marriage - or never. Furthermore, culturally Germans have no restriction in forming their partnership without official marriage, and these couples can be equally treated as a married couple in society. Given that young people

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[6] German Federal Statistical Office

[7] See section 2), for details.

[8] Regardless of age, home ownership rate in Germany is quite low, around 43 percent in 2013. OECD data

[9] Age 35 is not chosen by the author but left over in data processing. See section 3), for details.

nowadays leave parental home anyway when they want/can regardless of their family plan, considering 'marriage' as the only way of household formation is too restrictive. Therefore, the definition of household formation is rather widely defined as 'a formation derived by young children leaving their parent's nest and being their own householder'.

To the author's knowledge, the relationship between housing costs and move-out behavior of young people in Germany has not been studied so far. It is partly due to the fact that the German property market has gone through moderate changes for a long time, and its price has remained at a relatively low level compared to other developed countries. However, it started to show a rapid increase during last few years, and this trend was robust even during the economic crisis between 2008 and 2009[10]. This recent increase was even warned by the government and some experts thought that Germany might be at the beginning of a property boom[11][12], and has drawn a lot of resistance, which led to approval of a rent control law that limits increases to no more than 10 percent above the local average in areas deemed to have housing shortages in February 2015.

Amid this sweeping trend, this paper tries to identify the relationship between housing costs and a move-out decision of young people. Using data provided by *Immobillienscout24*, the variation of housing costs at more than 400 counties in Germany is added to the analysis. It is expected to complement the small longitudinal variation of housing price data, which is only available since 2007. SOEP (Socio-Eonomic Panel data) provided by DIW Berlin provides the rich feature of individual and household information, making identification of whether one moves out from a parental home or not feasible. Regional identification, which identifies where each subject lives and where they move to, is also derived from SOEP data at the county level and this identification is matched to housing cost data from *Immobillienscout24*. Details of the data will be introduced in section 3.

Discrete time survival analysis is adopted as the main specification in section 4, to verify the hazard rate of move-out from a parental home. To fit the discrete-time proportional hazard model, this paper uses a multinomial logit regression in which a move-out event is divided

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[10] According to the website www.globalpropertyguide.com which provides information and predictions on global property market for residential property investors, The German housing market was one of the few that avoided a slump in the wake of the 2008-2009 global financial crisis. Extremely low-interest rates and bond yields have encouraged rapid house price growth with persistently growing demand. House prices have been rising faster than rents and incomes.

[11] Vasagar, J. (n.d.). Germans develop a thirst to own their homes, from http://www.telegraph.co.uk/finance/newsbysector/constructionandproperty/9967397/Germans-develop-a-thirst-to-own-their-homes.html

[12] Global Property Guide. (n.d.), from http://www.globalpropertyguide.com/real-estate-house-prices/Ggermany

into three categories - '*Staying at parental home*', '*Move-out within county*' and '*Move-out to other county*'. This distinction is based on whether individuals move out from their parent's place and where they move to at next period if they do so, and designed to consider different implications depending on young people's destinations. Several robustness checks follow to show the robustness of results depending on differences in dealing with attrition issues and various baseline hazard function applied to the model. Results and robust checks are reported in section 5 and 6 respectively.

The conclusion is derived in section 7 and summarized as follows. First, young people's move-out decision is significantly affected by housing costs: The increase in rent in the current county decreases the hazard of move-out from the parental home within the county. Second, an overall increase in housing costs, expressed as a '*rent index*'[13], has a negative effect on a move-out decision, regardless of where they move to. Third, family-related factors are important concerns for young people when they move out. Fourth, regional characteristics in this research were not found significant when it comes to move-out from the parental home for the young. Results were robust against various settings in estimation verifying the strong influence of housing price to young people in making a move-out decision. From this, this paper concludes that affordable housing costs can encourage young people to form their own households in Germany after all. Although the current housing crisis and the late formation of adulthood in Germany is less problematic than they are in other developed countries, it should be emphasized that the burden of housing costs needs to be eased to facilitate the residential independence of the younger generation.

3.2   *Previous Research*

The link between economic factors and family formation of young generation was theoretically established by the Easterlin hypothesis in 1980. By the hypothesis, he argues that young people assess their economic well-being relative to the standard of living they enjoyed in their parent's households when they are considering marriage and childbearing. It implies that young people are likely to postpone important life time decisions until their financial stability is achieved. And that crucial economic threshold for them is securing a house they would live in because a new family formation presumes a residential move. Thus, there have been many attempts to explain the relation between the increase in housing costs and the late formation of new households of

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[13] Weighted average of rent in other counties. It represents a relative price of other counties compared to the rent in the current region. For details, see data description in section 3.

young people.

Haurin *et al.*(1993), based on a sample of young people in U.S in the 20s, showed that housing rents and earnings are significantly associated with decisions to leave the parental home and to marry. Ermisch and Di Salvo (1997) also showed the effect of housing price, parental income, potential future income and individual characteristics on the household formation decisions of a cohort of British men and women. The same results were found by Ermisch (1999) in which he provided evidence that a tighter housing market decreases the formation of partnerships.

In Mulder and Billari (2010), they set up four home-ownership regimes based on the share of owner-occupied housing and access to mortgages, and categorize 18 western countries into each group. In conclusion, they argue that there is a connection between home-ownership regimes and low fertility at the macro-level, taking into account the links at the individual and household level. Martinez-Granado and Ruiz-Castillo (2002) estimated a simultaneous model for the joint decisions of working, studying and leaving the parental household by young people in Spain, using cross-sectional data from the 1990-1991 *Encuesta de Presupuestos Familiares*. In their main results, they emphasized the role of housing costs and income as the crucial factors of household formation and related demographic decisions.

Within the body of literature concerning the residential separation of young adults from their parental nests, there are attempts to associate labor and housing markets with the 'headship rate', the rate at which young adults become independent household heads or spouses. Rogers and Winkler (2013), for example, estimated the impact of metropolitan area level housing and labor market variables on the individual-level decision to live independently and double-up. In conclusion, they identified rent as the most robust factor to the headship rate for young people, but the degree of the effect was quite small. Lee and Painter (2013) also examined the relationship between the labor market situation and the headship rate. Using PSID data on young adults, they analyzed how young adults who were initially living with their parents make a decision to leave home and either live independently as an owner or as a renter. In their findings, it was revealed that the higher unemployment rate as a macro variable and own unemployment status reduce exit rates from the parental household.

On the other hand, Martins and Villanueva (2002) assessed whether differences in household formation are associated with differences in access to credit. They used the reform in 1998 and 2002 on the interest rate of mortgages in Portugal as an exogenous change in the cost of credit, and estimated the impact of the cost of a mortgage on the probability that a young adult will leave their parental home. They found that young adults responded to the increase

in mortgage costs by delaying home purchases or by reducing the quality of housing services purchased. Furthermore, according to Yelowitz (2007), young adults consider many factors in deciding to leave their parental home. Using *Public Use Micro Data* sample from U.S. Census, he investigates the degree to which changes in the costs of housing and transportation between 1998 and 2002 correlate with young people aged 18 to 34 moving out of their parents home and into their own households and apartments. His findings showed that increases in housing and transportation costs play only a small role in a decision to leave home[14].

The same implications were also found in Asian countries where residential independence of young people from their parental home is strongly relevant to marriage. Hui *et al.*(2012), using aggregate annual time series data spanning the period 1976 to 2010 for Hong Kong, found that increases in housing prices and elderly dependency ratio led to the decrease in the birth rate and concluded that housing market restrictions lead to the postponement of couple formation and fertility. Chung (2012, 2013) using KLIPS (Korean Labor and Income Panel Study) data, found that increases in housing costs decrease the probability of forming a new household of young people as well.

To the authors knowledge, this is the first attempt to verify the effect of housing costs on move-out behavior of young people in Germany. One relevant research question was explored by Maennig and Dust (2008), in which they analyzed the quantitative relationship between 1992 and 2002 percentage change in population and house price level in 98 German cities in 2002. Their findings suggested no significant relationship between them, whereas a decline in population between 1992 and 2002 is associated with a significantly lower 2002 price level. However, their findings only explained the effect of demographic change on house price, not the other way around. This paper attempts to find an answer - the reversed relationship which has not been explored as yet.

3.3 Data

Three data sets are used in the analysis. First, house purchase price and rent cost data are provided by *Immobilienscout24*. Price variables from this dataset vary at the county level and their effects on a move-out decision will be the main interest in this paper. Second, SOEP data provides information on personal indicator, individual and household characteristics and identification of a move-out decision *etc*. Third, SOEP regional data, also provided by DIW, will

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[14] Network on Transitions to Adulthood Policy Brief, September 2006, Issue 32

be used to deduce in which county each individual resides, in order to examine how regional price affects individual decisions over the decision to move-out from the parental home.

3.3.1   House price and rent costs: Immobilienscout24

Immobilienscout24 is the biggest real estate portal in Germany. The site offers a huge range of accommodation options with adverts and exposes including detailed descriptions and photos. They provide house purchase price and rent cost data at county level *(Landkreise)* on request. The price is derived by a hedonic price model[15] based on the reference object. The reference object is an apartment with a size of 80 *sqm*, 3 rooms, medium object condition, medium degree of refurbishment, 30 years old and including cellar, balcony, built-in-kitchen and elevator[16]. The unit of the price is Euro per square meter *(sqm)*. Data is available from 2007 to 2014. It provides house purchase price and rent costs of more than 400 counties by each year. The annual average price and rent cost are reported in Table 3.1. Maintenance costs are not included here.

Figure 3.1 depicts Table 3.1, indicating that the increase of purchase price is steeper than that of rent costs between 2007 and 2014. Throughout observation years, the average purchase price and rent costs increased by 27 percent and 16 percent respectively. It means that the annual average rate of increase is only between 2 and 4 percent, which is fairly moderate. This low rate is partly due to the regional difference in the rate of increase. For example, in regions which draw many people in recent years -*e.g* Berlin and Hamburg - the rate of increase is between 10 and 15 percent per year.

Figure 3.2 shows the average annual rent costs by state. From now, the case of house purchase price is presented only when it needs to be because 1) Young people are less likely to own their own home generally, 2) German home ownership rate is remarkably low, around 43 percent in 2013, compared to other developed countries[17] and 3) In the estimation process, it was found

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[15] Hedonic pricing is a model identifying price factors according to the premise that price is determined both by internal characteristics of the good being sold and external factors affecting it. In economics, hedonic regression is a revealed preference method of estimating demand or value. It decomposes the item being researched into its constituent characteristics, and obtains estimates of the contributory value of each characteristic. Price provided by Immobillienscout24 is derived based on characteristics that reference object has.

[16] This can be fairly large for young single residents but it was the only available object from immobilienscout24. However, it is expected that house prices of small apartments can follow a similar pattern and would not distort the analysis especially when regional variety is accounted for.

[17] 1) There is the supply of good quality rental accommodation 2) Germans keeps the purse strings tight. 3) Germany's tax regime is not particularly favorable for property owners. 4) Germany offers tenants a good deal: Residents can check if their rent is fair using the rental index in city government website. If they are paying too much, the tenants association will step in for them. Also, rents are tightly controlled and cannot be normally increased by more than 20 percent over three years.

Tab. 3.1: Average Rent and Purchase price in Each Year

Year	Rent (Euro per sqm)	Purchase Price (Euro per sqm)
2007	5.2388	1105.648
2008	5.3421	1119.429
2009	5.4299	1137.852
2010	5.5348	1162.650
2011	5.6686	1218.495
2012	5.7978	1267.478
2013	5.9346	1333.682
2014	6.1091	1414.835

Source: *Immobilienscout24*

Fig. 3.1: Trends of Annual Rent Cost and Purchase Price
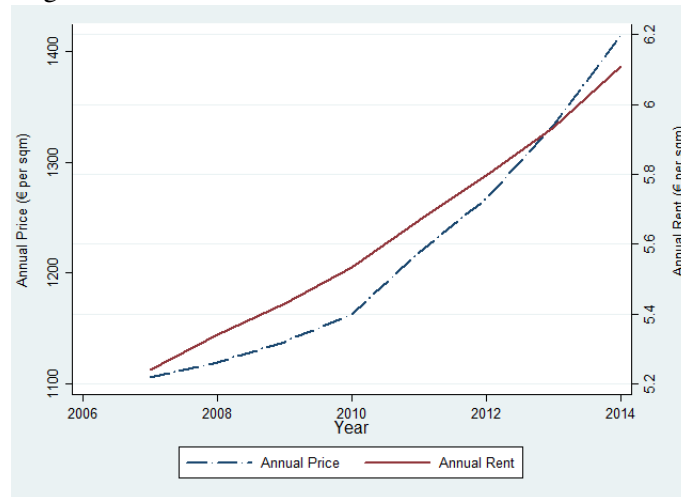
Source: *Immobilienscout24*

Fig. 3.2: Average Rent Costs by State
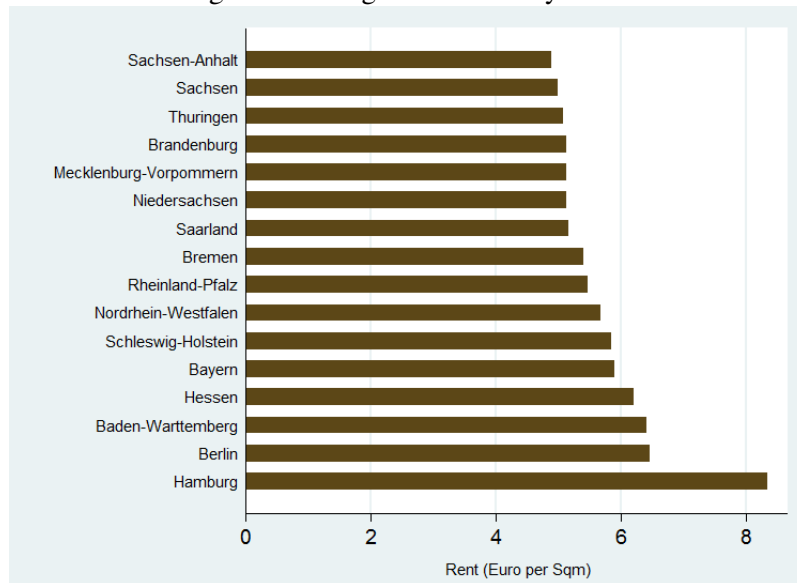
Source: *immobilienscout24*

that there is no significant difference between results with rents and those with house purchase price. According to Figure 3.2, the rent is the highest in Hamburg and it is followed by Berlin and Baden-Württemberg. States in former East Germany such as Sachsen-Anhalt and Sachsen are ranked last and second last in the chart. Even more than 25 years after reunification, the gap in housing costs between West and East seem apparent. Variation of rent cost is wider when data is described at the county level. Figure 3.3 shows the average rent costs by county and Figure 3.4 depicts the rate of increase in rent costs at the county level. Numbers presented in the map in Figure 3.3 are Euro per square meter, averaged over 8 years of the rent of each county. Numbers in Figure 3.4 represent the ratio of the rents in 2014 to those in 2007.

Figure 3.3 shows that the average rents in former West Germany are still more expensive than those in East Germany. The intensively shaded area in the map includes Baden-Württemberg in South-West, Hamburg in North and Berlin in East. According to Figure 3.4, regions where rent costs had increased by relatively large for last 8 years are mostly located in East-South, Berlin, Niedersachsen, and Hamburg.

Throughout the paper, it is assumed that young people will move out from their parental home to a place where housing is relatively inexpensive when other conditions are equal. Concerning where to move, it is divided into two different cases here - Move out to within a county and Move out to another county. It means that young people consider not only the rent in the current county where they have been living with their parents but also the rent in other places

Fig. 3.3: Rent Costs by County

Rent costs at county level (per sqm)

6.12~11.28
5.34~6.13
4.96~5.34
3.91~4.96
No data
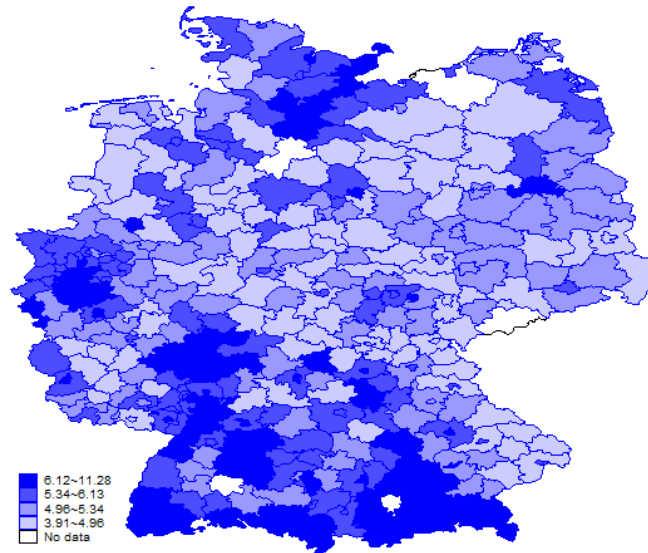
Source: *immobilienscout24*
Numbers next to the map report rent price per square meter.

Fig. 3.4: Increase in Rent Costs Between 2007 and 2014

Increase in Rent Cost between 2007-2014 at County level

1.21~1.46
1.15~1.21
1.11~1.15
1.01~1.11
No data

Source: *immobilienscout24*
Numbers next to the map report the rate of increase in 2007-2004.

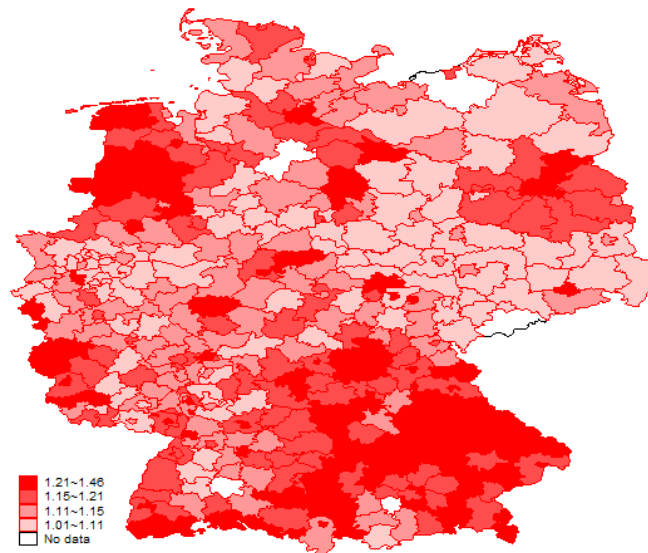as well, when they decide to move out and where they move out to. According to SOEP data in this research, around 70 percent of movers are moving to the other county from the county where they live with their parents. It implies they must be considering the price of other counties when they move. Also, this factor may induce young people to move to within a county. To take this into account, a single price index is added to the model as a measure of the price of other counties, which is constructed as the weighted average of rents over 400 counties except for the region where an individual person i lives. The weight is generated based on the population of each county, which is provided by the Federal Statistical Office[18]. This can be written as (3.1),

$$\bar{p}_j = \sum_{k=1}^{k=402(k \neq j)} q_k p_k \tag{3.1}$$

where q_k and p_k denote the weight assigned to a region k and the rent of the region k respectively. Because of the way it is constructed, the rent index variable has little variation from one region to the other. By taking two measures of housing costs -*Rent index* and *Rent* in the current region, we can interpret the change of the rent in the current region as a relative increase to the rent in other regions and vice versa. In following, the term 'rent index' refers to this index derived by the average rent costs in other regions.

3.3.2   SOEP Household Panel Data

The German Socio-Economic Panel (SOEP) is a wide-ranging representative longitudinal study of private households, located at the German Institute for Economic Research, DIW Berlin. For details, see the previous chapter or SOEP homepage[19]. Though household panel data in SOEP is available since 1984, this research uses data only after 2007 due to the limitation of use of house price data before 2007. SOEP V30 is used and it provides panel data up to 2013.

As control variables, individual and household characteristics are considered in the analysis. As a main empirical strategy, this paper adopts the discrete survival model using multinomial logit estimation which relates housing costs of a region where an individual lives with parents in year t to the decision to move out from parental home between t and $t+1$, controlling for individual and household characteristics, parental information and regional information at county level.

Individual characteristics, years in education, working status, sex, marital status and personal

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[18] Kreisfreie Städte und Landkreise nach Fläche, Bevölkerung und Beölkerungsdichte am 31.12.2014
[19] SOEP (DIW Berlin) from http://www.diw.de/en/soep

income are counted in the estimation. The age variable is dropped to avoid the multicollinearity problem because the baseline hazard in survival analysis is a function of study times, which is survey years in this case and changes along with one's age. The hazard rate of move-out from parental home is expected to increase with income as higher income helps young people financially and be more prepared to move out. However, the effect of income may have a different implication depending on where they move to. For example, someone who is not satisfied with current income (at t) is more likely to move to a new place (to other county) at next period ($t + 1$), seeking better opportunities.

The effect of education and working status on move-out behavior is not clear-cut as young people are likely to move out to pursue higher education and new career opportunity. If that is the case, the effects of that can be negative. A sex variable is added to verify how one's sex plays a role in the move-out decision. A short description from Micro-census data[20] showed that women tend to move out from their parental home earlier than men do. This may reflect the fact that women tend to marry at a younger age than their male counterpart. The effect of marital status is not clear as married people are more likely to decide to move out from their parental home but also they move out for marriage as well when they are single. The number of household members is also included to verify how the size of a household affects move-out behavior[21]. The effect of household size is also in question. It may increase the hazard of move-out because a large family means less space in a house and it mays pressure young people to move out from parental home sooner than otherwise. However, it may hold young people back if a large family implies strong family ties or a burden they have to bear as a young member of a family.

However, aforementioned factors can work differently depending on where young people move to. A factor which increases individual's hazard of move-out within the county can work in the opposite direction for the hazard of move-out to other county. It was found at the initial stage of estimation that a binary estimation, which regards 'Move-out' as a single event in the model, fails to capture the different effects of independent factors on move-out within a county and move-out to-other county. This was corrected by allowing multiple choices in the model using a multinomial estimation.

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[20] See Figure 3.5

[21] Household assets were considered initially. If one has enough assets in households, it can be easier for them to form independent household early, so long as they can get help from their family. Otherwise, it may have no significant effects. In estimation, the household asset was optionally considered as including this variable reduces the number of observations available for estimation by large, due to a lot of empty cells of asset information.

How to identify move-out event?

The most important part of this research is to identify the event 'move-out from parental home' in data. The move-out decision here only indicates the first move-out from a parental home for a child, excluding the case of boomerang kids who returned to their parental home after earlier move-out. To sort out young people who have never left their parental home up to a certain age, some restrictions were imposed to sample as follows.

First, I only take people who have at least one of their parents in Bio-Parent data in SOEP into account. In this way, young people who are participating in the survey independently from their parents will be excluded in the first place. Second, people only who have been living with their parents until 2007 are considered so as to detect their move-out decision during the observation period between 2007 and 2013. Third, people who emerged in survey after age 22 are removed to exclude the case of boomerang kids who already experienced their first move-out[22].

Move-out status of an individual between two waves is defined[23] if (a) The child shared a household number with at least one parent in the earlier wave, (b) The child's household number changed between the waves, and (c) The child's new household number did not equal the household number of any one parent in the later wave. In the SOEP survey, a household number is assigned to one or more than two people who live in a same household as a family. Thus, a change of household ID indicates a residential move and can be considered as leaving the parental home and forming its own household. Movers from this procedure are divided into two categories - Movers who move within a county and Movers who move to another county. 'Movers within county' is defined as people who move out at time $t + 1$ to the same county they stayed in with their parents at time t. 'Movers to other county' is the case where people move out to another county at $t + 1$ leaving the county they lived in with their parents at time t. This division comes from the idea that factors in our interests will affect not only the move-out decision but also where individuals move to.

As the targeted sample in the estimation is young people whose parents have been participating in the SOEP survey, it is feasible to control parental characteristics such as their age, education level, and income in the analysis. The impact of parental characteristics on the move-out decision is not clear-cut and may give different implications depending on their cultural background to a certain extent. For example, the hazard rate of move-out event can decrease with parental

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[22] Leopold, Geißler and Pink(2011) argued that this restriction also reduces the potential age bias in towards stay-at-home children that still lived with their parents at advanced ages.

[23] Leopold, Geißler and Pink(2011)

Fig. 3.5: Gender-based Difference in Living with Parents
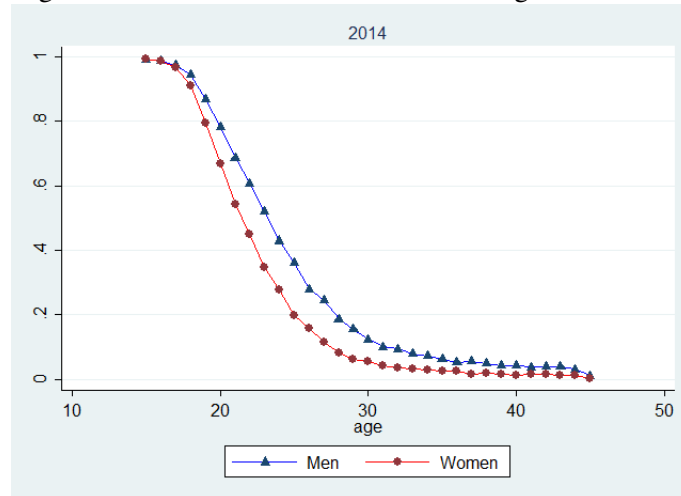
Source: *Microcensus, Bevölkerung - darunter ledige Kinder 2014*

age in counties where children are expected to take care of their parents nearby. The effect of parental income is not clear as well. It may increase the hazard of move-out if culturally it is common for parents to help out their young children financially, but can have no effect at all or even be negative if the financial and emotional independence of children, by leaving their parents early, for example, is more valued and emphasized in society. Parent related variables such as parental age, years in education and income will help examine this. These variables are defined as the average of the trait value of father and mother. If one has a single mother or father, single parent characteristics replace the variables.

Issue of Attrition

The proportion of young people who are identified as "moved out" from parental home between 2007 and 2013 was significantly lower than expected in my data. Whereas Microcensus data[24] shows that around 24 percent of 25-years-old unmarried children are living with their parents as shown in Figure 3.5, movers in data generated by the above process account for only about 7.4 - 31.5 percent of young people who are at the risk of move-out event. This rate varies depending on how to deal with the attrition which refers to the case that individual observations drop out from the study over time. Attrition may occur for a number of reasons, including insufficient compensation for survey response, transfer of residence, or death of the respondent, but mostly it comes from a failure to follow-up data when a subject leaves the current household.

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[24] Microcensus, Bevölkerung - darunter ledige Kinder 2014, provided by Federal Statistical Office

In principle, SOEP follows individuals who leave original households but can fail to do so when respondents do not respond or refused to be included in the survey anymore. It is likely to occur when there are residential moves of subjects, as it generates extra inconvenience to be in the survey. Also, young people in this study have been participating in the SOEP survey since they were children through their parent's participation, and they only become an independent respondent at age 18 or by forming their own household[25]. This fact can cause the drop-out event of young people from the survey after all because young people's participation in the survey was not likely to be of their own volition beforehand. Thus, there can be a large possibility that SOEP failed to follow up a large proportion of young movers. Thus, this paper assumes that individuals who left the sample fall into a move-out case. This assumption allows more observations to be classified as a move-out case and to contain more information because of that, without discarding observations. For robustness checks, estimations imposing different assumptions on the attrition will be taken into account. The ways that these assumptions on attrition were made are described as case 1) - case 3). The number of move-out cases and the proportion of movers in the data vary by large amount, depending on how to deal with attrition as shown in Table 3.2.

- Case 1) Individuals who left sample can be considered as non-movers

- Case 2) Individuals who left sample can be considered as movers

- Case 3) Individuals who left sample are invalid and removed from sample

The proportion of movers in data is the lowest in case 3) and is the highest in case 2). Case 3) is not appropriate to take because it wastes information and faces a sample selection issue. This was partly adjusted by applying panel weights in the estimation. Individuals who left the sample are regarded as non-movers in case 1), which is quite restrictive given that the follow-up process in SOEP is incomplete as explained above. To check up robustness of the main result, results of estimations with assumption 1) and 3) will be presented in section 6.

Tab. 3.2: Number of Observations and Movers

	Case 1)	Case 2)	Case 3)
Movers	351 (12.2%)	1160 (31.5%)	203 (7.4%)
Non movers	2530 (87.8%)	2530 (68.5%)	2530 (92.6%)
Total	2881 (100%)	3690 (100%)	2733 (100%)

Source: SOEP V30

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[25] As of 2006, the individual interviews based on the standard adult questionnaire are introduced one year later when household members reach the age of 18 (SOEP group 2013)

Proceeding analysis with case 2), it raises a question about 'where they move to' because attritions can only explain the fact that they left the household where they have been living with their parents, without revealing any information on their residence in the next year. Thus, this paper defines 'within-movers' in the case of attrition as people who dropped out from the panel and whose last residency is matched with a county where their parents live in 2013. If the attritor's last county is not matched with the county where their parents live in 2013, they are regarded as 'movers to other county'.

3.3.3 SOEP Regional Data

SOEP regional data[26] provides regional identification of residents of SOEP respondents and information of the region in which residents live at various levels from postal codes to states. Due to the sensitivity of data, specific security provision is observed by SOEP[27]. County level data was used in this paper for the consistency with house price data provided by *Immobilienscout24*.

County-level data consists of 'Rural district' *(Landkreise)* and 'Urban district' *(Kreisfreie Städte)*. Since 2011, Germany has been administratively divided into 402 districts, 295 of which are rural districts, districts made up of several municipalities, and 107 urban districts. Urban districts cover most major cities in Germany and govern their own local government with their own rights whereas rural districts provide service for the smaller towns and villages[28].

The SOEP county-level data provides users with a dataset containing a household identifier for SOEP households, the county in which the SOEP household lives and further information such as employment rate, the proportion of foreigners, the population and the size of the area at a county level. All of these are used as regional controls in estimation, except a variable 'population' due to a lack of observations. SOEP regional data contains not only the original county code but also a recorded county code that facilitates longitudinal analysis at the county level. Original county codes are codes provided by the survey institute *infratest Sozialforschung* to the SOEP group[29]. Recorded county codes are contained in SOEP from 1997, which renders county data compatible with external data. As regional information of individuals in SOEP

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[26] In Germany, access to detailed regional data is strictly regulated. Most of the analysis here is carried out on-site at the German Institute for Economic Research, DIW Berlin and through remote execution services (SOEP remote).

[27] Check SOEP website, http://www.diw.de/en/diw_02.c.222519.en/regional_data.html

[28] "Country Compendium, A companion to the English Style Guide" European Commission Directorate-General for Translation (EC DGT). February 2017. pp. 50-51.

[29] Knies and Spiess (2007)

Variable	Mean	Std. Dev.
Age	23.97	4.34
Years in education	7.53	6.81
Female	0.48	0.49
Married	0.05	.
Working	0.51	.
Personal income (€)	9710.48	14998.32
Rent (per *sqm*)	6.526	1.538
Rent index (per *sqm*)	6.347	0.225
Household size	3.32	1.56
Parents age	53.45	7.87
Parents income (€)	35633.04	42129.18
Parents yrs in education	12.13	3.36
Employment rate	51.79	4.56
Proportion of Foreigners	8.74	5.35
Size of Area (km^2)	930.25	735.23

Source: SOEP V30, *Not weighted.*

needs to be merged with house price data at a regional level, I only consider recorded county codes.

Table 3.3 shows the variable description used in the analysis, based on the assumption that subjects with attrition in the next period are regarded as movers. Note that the age variable is added in the table, only for information. As final data consists of people whose parents have participated in a survey before they become age 16 and only people who have not left their parents place in the beginning of observation years, the average age of people in data is only 23. The maximum age in the data between 2007 and 2013 is 35 years old, thus the age of people in the data varies in a range between 16 and 35 years old during the observation period. Children and parental income are normalized by 1000 in estimation, and the rent and rent index will be log-transformed. Lower income and lower education of a child than those of parents reflect children's younger age. Half of the observations are females and only half of young people are in work. Very few of them are married, taking only 5 percent in observations, thus this variable is dropped out in the final stage. The last three variables describe regional characteristics. In final sample, the data indicates that people live in 386 different counties out of 402 counties, providing sufficient regional variety. In total, there are 3690 observations in the data, of which 68 percent never moved out during the study years and 32 percent remained with their parents. This number of observations increases to almost 27,000 when the data set is reorganized to conduct survival analysis. The details of the specification follow in the next section.

Both the rents in the current region and rent index of other regions are taken in the model in a log-form. If the rent increases in the current region, it is expected that young people are less likely to move out within the county. Furthermore, the increase of rent in a current county may even crowd out young people who otherwise would have moved within the county with the result they move to other counties. This holds same in the increase of rent index, which measures general rent costs of other regions. If the rent index increases, given that rent in the current region is fixed, young people are likely to seek a place within the county in response to the increase of relative rent costs in other counties.

On the other hand, the price increase in a county A may not be influential at all for someone who has a certain county in his/her mind, regardless of housing costs in whichever location. For example, a specific school, work or relationship can draw people to a specific region. Those are county-specific factors which can not be controlled here, due to data limitation. Control variables in this study are able to control only the influence of individual/household characteristics and characteristics of a current region, without considering a 'drawing factor' from counties the young people move to. If that effect is dominant, the increase in housing costs in counties where one is not interested in will have no effects on a decision on move-out to other alternative places. For some cases, people may hold on until the price of the county where they wanted to move to becomes more affordable, showing no move at all from their parental home in the meantime. These possibilities can make the effect of an increase in costs in current county/other county on move-out within the county/to other county uncertain. Table 3.4 describes these expected effects.

Tab. 3.4: Expected Effects of Housing Costs

	The Rent of current region	The Rent of other region (Index)
Move-out within county	Negative	Positive /Negative
Move-out to other county	Positive/Negative	Negative

3.4   Specification

Survival analysis is a regression method which describes the probability of an event occurring within an arbitrary time t. It obtains its name from studies of mortality, but its applications are now wide-ranging. Survival time can either be analyzed as a continuous or discrete variable, depending on how data is collected. In our case, discrete time survival analysis is appropriate as move-out status is measured at discrete time intervals (every year) despite the fact a move-out

event is intrinsically a continuous event. In general, only a single type of event failure is distinguished in discrete time survival analysis and modeled using a logistic regression. However, there are cases that individuals face multiple destinations like this one where individuals have a choice of where to move, not just of whether or not to move.

Previous literatures have been addressing this case by using competing risk models[30]. Competing risks are said to be present when a subject is at risk of more than one mutually exclusive event, and the occurrence of one of these will prevent any other event from ever happening. Alison (1982) suggested that just as the single-event model can be estimated with a binomial logit program, the multiple-event model can be estimated by using a multinomial logit program[31]. In Jenkins (2005), he argued that 'multinomial logit' model of competing risks can provide a method to this case if data is intrinsically discrete. However, it can be still feasible even though data is interval-censored but not intrinsically discrete, with an assumption that the interval hazard is relatively small.

Multinomial logit model chosen here imposes somewhat strict assumption that there are no correlations between unobservable factors affecting each other destination-specific hazard, implied by the independence from irrelevant alternatives assumption (IIA)[32]. This is likely to be violated if one alternatively chose to move within the county when move-to other county is neither feasible nor affordable. IIA assumption will be tested later to check whether it is violated or not. Another restriction in using the multinomial logit estimation discussed in Allison (1982) is that multinomial logit requires a complicated calculation and it is vague sometimes to specify each different event[33]. However, multinomial logit can be easily estimated in current software and is fully efficient[34]. Additionally specifying each event into : (1) No-move (2) Move within the county and (3) Move to other county- is not a cumbersome process in our case because the exclusiveness of three statuses is pretty obvious.

Equation (3.2) defines a discrete-time hazard rate for each event. P_{tj} describes a probability that an individual chose a status j at time t conditional on that there has been no event until

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[30] Jenkins (2005), Steele and Washbrook (2013), Clapp *et al.*(2002)

[31] He also suggested a method which treats other alternatives as 'censored' case at the beginning of the interval in which the event occurred applying the methods for single kinds of events. This procedure yields a conditional ML (Multinomial Logit) estimator which possesses the usual ML properties of consistency and asymptotic normality but is not fully efficient

[32] IIA property restricts the odds ratio of choice probabilities, j and k, so that they do not depend on any alternatives other than j and k. This in turn implies no correlation between the unobserved components of utility for alternatives

[33] Alison argued conditional ML (Multinomial Logit) can be useful otherwise, taking an example of cancer and death, in which the cause of death can be various other than cancer

[34] Andersen (1973)

time t. The unit of time t is a year and its range varies between 1 and 19 depending on how many years over age 16. SOEP data is already structured including one observation for each year with independent variables in the model - from origination up to and including the period of termination. It provides a convenient method for dealing with a hazard of the event over time. $j = 1$ indicates an event of move-out to within a county and $j = 2$ an event of move-out to other county. Note that 'No-event' status is not included in J. P_t is a summation of P_{t1} and P_{t2} and indicates the overall hazard rate which describes a hazard that any event occurs to an individual at time t.

$$P_{tj} = Pr(T = t, J = j | T \geq t) \tag{3.2}$$

$$L = \prod_{i=1}^{n} \left(\frac{P_{t_i j_i}}{1 - P_{t_i}}\right)^{\delta_i} \prod_{k=1}^{t_i} (1 - P_k) \tag{3.3}$$

Equation (3.3) shows the likelihood function structured based on (3.2). Suppose that individual i experiences event j_i at time t_i or else is censored at t_i. $\delta_i = 1$ if an event occurred at time t_i and otherwise set it zero. Thus the likelihood function in (3.3) represents a survival rate of an individual i till time t when there was no event[35].

$$P_{tj}(Y_{it} = j) = \frac{exp(\alpha_{jt} + \beta_j' x_t)}{1 + \sum_{l=1}^{2} exp(\alpha_{jt} + \beta_l' x_t)} \tag{3.4}$$

where $j = 1, 2$.

$$P_{t0}(Y_{it} = 0) = \frac{1}{1 + \sum_{l=1}^{2} exp(\alpha_{jt} + \beta_l' x_t)} \tag{3.5}$$

Equation (3.4) is a generalization of the logistic model, indicating a probability of an individual i choosing j where $j = 1, 2$. When there is no event, (3.4) is reduced to the equation (3.5) where coefficients are set to zero. x_t in (3.4) is a vector of independent variables which might be time-varying or defined at the episode or individual level. β_j is a vector of coefficients for a category j. α_{jt} is a function of time which characterizes the impact of time on the hazard of

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[35] Alison (1982) noted that unlike the likelihood function for the continuous-time model, the discrete-time likelihood cannot be factored into separate components for each of m kinds of event. Hence multinomial logit estimation must be done simultaneously for all kinds of events.

event j. In the main estimation α_{jt} is specified as a function of piecewise baseline hazard[36].

Substituting (3.4) into (3.3) and taking the logarithum yields the log likelihood for a multinomial logit problem in which all observed time units for all individuals are treated as separate, independent observations[37]. Just as the single-event model can be estimated with a binomial logit program, the multiple-event model can be estimated by using a multinomial logit program. Multinomial logit model directly models the probability of observing a risk versus another. Note that competing risks are included in equation (3.4) and (3.5) by having hazards that must sum to one at each observation point. Thus, an increase in the probability of one risk must be associated with a decline in the probability or at least one other risk.

As explained, the multinomial logit model requires independence of irrelevant alternatives (IIA). This assumption means that elimination of one of the choices should not change the ratio of probabilities for the remaining choices. This assumption is likely to be violated when choices are close in a sense that their utilities are stochastically correlated. For example, if move-out to other county is an alternative to move-out within a county for individuals it has a high chance of violating IIA assumption. This can be tested after estimation.

To conduct survival analysis under this set-up, we determine first who is at risk. As shortly described in previous section, the cohort who have been living with their parents since age sixteen and who never left their parental home until the year 2007 are considered at risk of moving out of the parental home. The number of observations and control variables at this stage is the same as Table 3.3. Data is reorganized in a persons-period form consisting of annual information of the individual from age 16 to current age. Table 3.5 shows the sample size after this process. Sequence year in the table indicates $n-th$ year since age 16 of each individual. This table is generated assuming people who vanished from the data are labled as movers. Note that the number of observations decreases with 'sequence year[38]' because of the right censoring in year 2013[39] and the occurrence of a move-out event. Also, note that more than half of observations are either censored in data or leave the data in the first five years before they reach 21 years old. Also, the number of people who have been staying with their parents until age 35 years old is 55.

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[36] In detail, pieces are divided based on study time. Among 19 study years, observations falling into one of first three years get assigned 1 in *Dur1* variable. The second piece is named Dur2 and assigns 1 for observations falling into second three years. In this way, 6 pieces are defined and the last piece contains 4 years.

[37] Allison (1982)

[38] Numbers assigned to the sequence year indicate the number of years above 16 years old

[39] Data is right-censored and thus individuals no longer appear after 2013. Thus some individuals exit data only after few years of presence in SOEP before an event occurs.

Tab. 3.5: Number of Observation by Sequence Year

	Frequency	Percent	Cum.
1	3484	12.63	12.63
2	3484	12.63	25.26
3	3158	11.45	36.71
4	2848	10.33	47.04
5	2567	9.31	56.34
6	2212	8.02	64.36
7	1878	6.81	71.17
8	1611	5.84	77.01
9	1388	5.03	82.05
10	1158	4.20	86.24
11	958	3.47	89.72
12	787	2.85	92.57
13	615	2.23	94.80
14	477	1.73	96.53
15	365	1.32	97.85
16	258	0.94	98.79
17	180	0.65	99.44
18	99	0.36	99.80
19	55	0.20	100.00
Total	27,582	100	

Source: SOEP V30

To avoid the endogeneity issue that may arise due to unobservable factors affecting move-out behavior, one year lagged control variables are considered in the estimation, except parent related variables which are not likely to vary during the study period. Thus, a move-out decision at time $t+1$ is based on factors at t. Note that it is assumed that a young person in their parental home is not paying any expenses related to their residency to their parents. Each individual faces three choice sets every year, and choose one state considering all the related factors.

The result of multinomial estimation is hard to interpret in some cases because a coefficient indicates only the relative probability of one choice over the other. More accurately, coefficients are effects on log-odds of moving out within a county (status 1) versus no-move (status 0) as move-out is defined as the reference category here. This feature could be not desirable in a case where choosing a base category is also worth an interpretation. In our case, however, this feature of multinomial logit is not problematic because of a special situation in survival analysis that 'moving out within a county' and 'moving out to other county' are originated from the 'no-move' status. This makes interpretations based on the reference category more sensible.

3.5   Results

Table 3.6 shows the result of multinomial logit of competing risk model. Longitudinal weight is applied to adjust for attrition in all cases[40]. Results are presented both in coefficients and in average marginal effects[41]. Here, the marginal effects are reported to draw a conclusion about actual probabilities. Considering sign, the results expressed as coefficients and marginal effects showed no difference. Column (1) and (2) present the effects on decisions on move-out to within a county and to other county respectively, based on 'no-move status' as a reference category. According to the result, coefficients of most of the variables from two cases report different signs, implying that estimating a single-exit-type hazard regression model (*i.e.* not differentiating between the different types of move-out) may not give a sufficiently rich picture about different impacts of variables on the hazard of move-out.

Notably, the effect of rent on the hazard of move-out varies depending on where they move to. First, if the rent in the current county increases, the hazard of move-out within a county is reduced, and that of move-out to other county is increased. Their marginal effects are not statistically significantly different from each other in the absolute value. If the rent index stays constant, the increase of rent within a county means that its relative price increases and those people who actually move - for other reasons than the change in the overall rent index- are more likely to move to other counties and are less likely to move within the county. Different signs of the effect of rent on move-out to other county and to within the county explain this, although the effect of the former is not significant at a 95 percent confidence level. The size of the effect of rent in column (1) is quite large. For example, when the rent in the current county is double, the odds of moving out from the parental home within the county will be only 18 percent ($2^{-2.4} = 1.8$) of what it would have been otherwise. This finding is consistent with the initial assumption that people who are living in a county where the rent is higher are less likely to leave their parental home to make independent living within the county. As shown with the insignificant effect of the rent in column (2), the crowd-out effect was not found, suggesting the effect of an increase in the rent in the current region is likely to be limited in the county.

On the other hand, the increase in rent index[42] induces people to move less both within a county

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[40] In general, the weighting factor for a longitudinal sample can be calculated as the product of the weighting factor of the start wave and all the reciprocal staying factors to the end of the longitudinal sample. J.P. Haisken-DeNew and J.R. Frick, Desktop companion to the German Socio-Economic Panel (SOEP), 2005

[41] The marginal effects Stata computes are the incremental effect of the predictor on the probability of that particular outcome and are not relative to a baseline outcome, nor do they take into account the other outcomes.

[42] Without normalization, coefficients of rent index are about 40-50 depending on specifications. Large coefficients of rent index on hazard can be explained by large variance of these variables. As shown in construction of a

and to other counties. This is confirmed by its negative marginal effects in both transitions. The marginal effect is larger for the case of move-out to other counties in absolute terms (marginal effects), which is plausible given that the increase in rent index decreases the relative price of rent in current county where an individual lives with their parents. However, the relative decrease in rent in other county did not really increase the hazard of move-out within a county, implying that the increase of overall price deters young people from move-out from parental home at all. There are several conjectures although they should be made cautiously. First, the overall housing costs, expressed by a rent index, might discourage a sort of consumer confidence. Second, it might be a case that young people are waiting for the right time to move out to other county - or 'A specific county' - by staying with their parents and saving expenses in the mean while. The fact that around 70 percent of young movers are moving to other county when they leave their parental home for the first time supports this hypothesis to some extent[43].

Marginal effects of the rent reassure these findings as reported in Table 3.6, and they are graphed as Figure 3.6. In multinomial logit estimation, the marginal effects are nonlinear and vary across values of all the variables in the model[44]. Figure 3.6 shows how predicted probability of column (1) and (2) varies as the log-transformed rent increases. The slope of curve indicates marginal effects of the rent variable when other independent covariates are fixed at the mean. The decreasing rate of predicted probability for move-out within the county is slightly higher when rent is relatively lower, when log-rent is below 1.7, 5.47 Euro per square meter, but it becomes flatter as the rent increases. Overall, the marginal effect of the rent changes smoothly being close to a linear relation. The marginal effect here, -0.0076, is reported as the average value and indicates that a one percent increase in rent is associated with a decrease of 0.0076 in the predicted probability of move-out within a county.

Referring to column (1) and (2), they report that education and sex variables have no significant impact on the hazard of move-out in any case, although education shows negative and significant effects depending on specifications in robustness checks.The variables marital and working status are removed in final estimation due to the fact that its cell was almost empty within mover's cases. The variable individual income shows a negative impact especially when it is a case of move-out to other county. This could be explained as people tend to move away from a

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rent index, the rent index is derived by a summation of other counties's rent minus current county's rents. Thus it has little variation over counties. It generates relatively large coefficient thus it is normalized in estimations.

[43] Results with purchase price, which is not reported here, provides almost same results as above but the effects of purchase price on the move-out decision are less significant only with 10 percent of significance level. This shows that purchase price has relatively weak impact on the move-out decision of young people.

[44] When $\pi_{ij} = Pr(Y_i = j)$ is defined as a probability of choosing a choice j, marginal effect of the $k-th$ predictor x_k can be written as follow after taking derivatives $\frac{\partial \pi_{ij}}{\partial x_{ik}} = \pi_{ij}(\beta_{jk} - \sum_r \pi_{ir}\beta_{rk})$

- Move-out (row labels)
- (1) Within: Coefficients | M.E
- (2) To Other: Coefficients | M.E

Rent costs: -2.433** | -0.0076** | 1.075 | 0.0092
(0.96) | (0.003) | (0.889) | (0.0071)
Rent index: -0.543*** | -0.0017*** | -0.395*** | -0.0032***
(0.0432) | (0.0003) | (0.0429) | (0.00037)

Education: -0.029 | -0.00015 | -0.014 | -0.000094
(0.021) | (0.00009) | (0.024) | (0.00018)
Female: -0.125 | -0.0011 | 0.314 | 0.0019
(0.359) | (0.0011) | (0.325) | (0.0025)
Personal Income: -0.026 | -0.00011* | -0.047*** | -0.00032***
(0.016) | (0.00006) | (0.014) | (0.00011)
Household size: 0.474*** | 0.0018*** | -0.85*** | -0.0075***
(0.099) | (0.00038) | (0.176) | (0.0018)
Parent age: -0.101*** | -0.00029** | -0.145*** | -0.0012***
(0.039) | (0.00013) | (0.03) | (0.00029)
Parent income: 0.005* | 0.000016* | -0.008 | -0.000066
(0.003) | (9.62e-06) | (0.007) | (0.00006)
Parent education: 0.059 | 0.00016 | -0.052 | -0.00035
(0.065) | (0.00023) | (0.049) | (0.00042)
Employment rate: 0.048 | 0.00017 | -0.034 | -0.00031
(0.051) | (0.00016) | (0.054) | (0.00043)
Foreigner: 0.049 | 0.00015 | 0.034 | 0.00021
(0.035) | (0.00012) | (0.035) | (0.00028)
Area: -0.00021 | -0.00011 | 0.00034* | 0.00026*
(0.00023) | (0.00073) | (0.00018) | 0.00015
Dur1: -4.114*** | -0.014*** | 13.537** | 0.113**
...

Tab. 3.6: Result of Multinomial Logit Estimation

Move-out	(1) Within		(2) To Other	
	Coefficients	M.E	Coefficients	M.E
Rent costs	-2.433**	-0.0076**	1.075	0.0092
	(0.96)	(0.003)	(0.889)	(0.0071)
Rent index	-0.543***	-0.0017***	-0.395***	-0.0032***
	(0.0432)	(0.0003)	(0.0429)	(0.00037)
Education	-0.029	-0.00015	-0.014	-0.000094
	(0.021)	(0.00009)	(0.024)	(0.00018)
Female	-0.125	-0.0011	0.314	0.0019
	(0.359)	(0.0011)	(0.325)	(0.0025)
Personal Income	-0.026	-0.00011*	-0.047***	-0.00032***
	(0.016)	(0.00006)	(0.014)	(0.00011)
Household size	0.474***	0.0018***	-0.85***	-0.0075***
	(0.099)	(0.00038)	(0.176)	(0.0018)
Parent age	-0.101***	-0.00029**	-0.145***	-0.0012***
	(0.039)	(0.00013)	(0.03)	(0.00029)
Parent income	0.005*	0.000016*	-0.008	-0.000066
	(0.003)	(9.62e-06)	(0.007)	(0.00006)
Parent education	0.059	0.00016	-0.052	-0.00035
	(0.065)	(0.00023)	(0.049)	(0.00042)
Employment rate	0.048	0.00017	-0.034	-0.00031
	(0.051)	(0.00016)	(0.054)	(0.00043)
Foreigner	0.049	0.00015	0.034	0.00021
	(0.035)	(0.00012)	(0.035)	(0.00028)
Area	-0.00021	-0.00011	0.00034*	0.00026*
	(0.00023)	(0.00073)	(0.00018)	0.00015
Dur1	-4.114***	-0.014***	13.537**	0.113**
	(1.042)	(0.0041)	(6.654)	(0.049)
Dur2	-4.071***	-0.015***	15.915**	0.132**
	(1.046)	(0.0042)	(6.657)	(0.049)
Dur3	-2.527**	-0.011**	15.845**	0.132**
	(1.023)	(0.0037)	(6.669)	(0.049)
Dur4	-2.527**	-0.011**	17.648***	0.146***
	(1.064)	(0.004)	(6.787)	(0.05)
Dur5	-0.487	-0.0039	17.237**	0.142***
	(1.046)	(0.0037)	(6.827)	(0.051)
Constant	102.07***		63.962***	
	(7.504)		(6.92)	
Observations	14224		14224	

Robust standard errors are in parenthesis. *: p<0.1, **:p<0.05, ***:p<0.01. Column (1) is the multinomial logit of move-out within case, column (2) is of move-out to other case respectively. Rent is rent cost per square meter in current region where individuals live with their parents, Rent index is price index of other counties. Both measures are log-transformed and normalized by 100.

Fig. 3.6: Marginal Effects of Rents
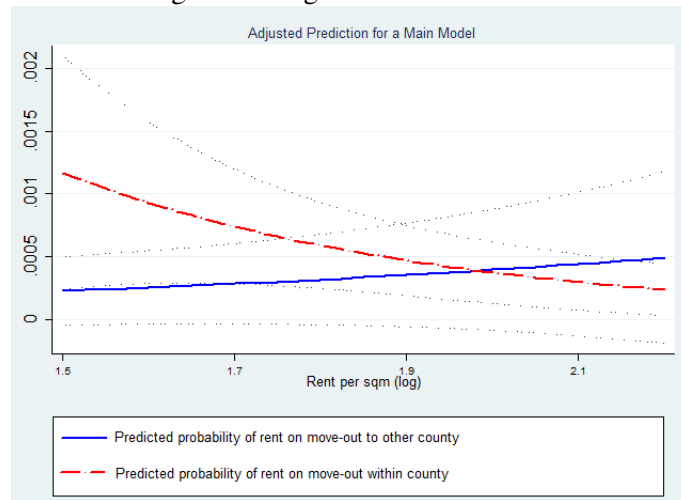
Source: SOEP V30, Authour's calculation. Dashed lines signify 95% confidence intervals.

current place when current job conditions are not satisfactory.

The effect of household size consistently shows robust effects on the hazard of move-out for both cases but in the opposite direction. According to the results, the additional household member in a household increases the hazard of one's move-out within the county but decreases that of move-out to other county. It might reflect the fact that people may not want to live far from their family when the family is big and has a strong bond, assuming a bigger family has strong family ties. This bond to a family is found again from the effect of parental age on the hazard of move-out. In findings, young people whose parent's age is older are less likely to move-out regardless of destinations. This effect is stronger when it is a case of move-out to other county. Parental income shows a slightly positive effect on move-out within the county case, implying that parent's financial status may help out the young to build their own households. However, this implication is not found in a case of move-out to other counties.

Regional characteristics such as the regional employment rate, population of foreigners and the size of the area in the current region have no significant impact on the hazard of move-out. Only the size of the area shows a slightly significant impact on the hazard of move-out to other county, indicating that people in a big county are more likely to move out from their parent's place to another city. The estimated coefficients of the duration interval dummies (*Dur1- Dur6*) highlight the similar time dependency between two move-out choices, which is the hazard generally rises over time but non-monotonically in both cases.

Multinomial logit models assume that odds for each specific pair or outcomes do not depend on

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the other outcomes available. This is called "Independence of Irrelevant Alternatives (IIA) assumption" and can be examined by Hausman test proposed by Hausman and McFadden (1984). According to the result, the relative odds between any two outcomes among three are independent of nature of other outcomes being simultaneously considered, and it verifies IIA assumption is held[45]. This test accords with the result that the rent increase in the current region does not crowd out young people to other county, and they rather live with their parents longer. Additionally, multicollinearity was also examined by taking VIF (Variance inflation factor) test after running a linear estimation. VIF values of all variables used in estimations were below 3, indicating that there is no worrisome linear combination between independent factors in the model.

3.6   Robustness Checks

3.6.1   Application of various baseline hazard function

Based on the main estimation in Table 3.6, results of estimations using different baseline hazard functions are reported here. Log, polynomial and nonparametric baseline functions are applied in order, as shown in Table 3.7. No-move status is used as a baseline category in all estimations, and results are reported only in coefficients.

Results of move-out within county reassure findings from main estimation by reporting the negative effect of the rent in the current region on the hazard of move-out within the county. It is strongly significant, regardless of the shape of baseline functions. The rent index shows a strong and negative impact on the hazard of move-out in any cases. Again, this implies young people tend to stay in with parents when overall price increases. As found in the main estimation, the household size and parental age mainly play a role in a decision on move-out from the parental home. The choice over move-out to other county is negatively and significantly influenced by individual income, and the young who have been living in a larger area are more likely to move out to other county.

The hazard functions of four estimations with piecewise baseline, log baseline, polynomial baseline and nonparametric baseline are graphically expressed in Figure 3.7 by study year from

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[45] Except one case where omitted category is status=0 and which supports IIA assumption, the rest of the cases give a negative chi-square statistic. Hausman and McFadden (1984:1226) notes that this test can be negative if $\hat{Var}(\hat{\beta}^r) - \hat{Var}(\hat{\beta}^f)$ is not positive semi-definite and suggested that negative chi-squared values be recorded as 0 with the corresponding p value 1. They conclude that this is evidence that IIA holds and I use this decision rule in the analysis.

Tab. 3.7: Multinomial Logit with Other Baselines Hazard Functions

| Move-out	(1) Log		(2) Polynomial		(3) Nonparametric	
	Within	To Other	Within	To Other	Within	To Other
Rent costs	-2.176***	0.861	-2.406***	0.826	-2.75***	1.234
	(0.875)	(0.879)	(0.943)	(0.905)	(0.942)	(0.858)
Rent index	-0.541***	-0.428***	-0.551***	-0.415***	-0.564***	-0.421***
	(0.042)	(0.044)	(4.697)	(0.043)	(0.046)	(0.041)
Education	-0.023	-0.022	-0.034	-0.019	-0.041*	-0.018
	(0.019)	(0.023)	(0.022)	(0.024)	(0.022)	(0.022)
Female	-0.347	0.377	-0.163	0.393	-0.351	0.357
	(0.368)	(0.341)	(0.365)	(0.341)	.(0.359)	(0.326)
Personal Income	-0.025	-0.046***	-0.029	-0.044***	-0.031	-0.045***
	(0.019)	(0.014)	(0.017)	(0.014)	(0.016)	(0.013)
Household size	0.482***	-0.961***	0.492***	-0.935***	0.502***	-0.936***
	(0.091)	(0.018)	(0.103)	(0.192)	(0.104)	(0.175)
Parent age	-0.095**	-0.158***	-0.113***	-0.148***	-0.109**	0.165***
	(0.042)	(0.031)	(0.041)	(0.029)	(0.039)	(-0.032)
Parent income	0.004	-0.0075	0.006*	-0.0087	0.006*	-0.0093
	(0.004)	(0.0073)	(0.003)	(0.0078)	(0.003)	(0.008)
Parent education	0.043	-0.056	0.059	-0.0052	0.051	-0.044
	(0.083)	(0.052)	(0.072)	(0.0532)	(0.065)	(0.05)
Employment rate	0.048	-0.052	0.039	-0.057	0.029	-0.055
	(0.051)	(0.056)	(0.051)	(0.056)	(0.052)	(0.052)
Foreigner	0.047	0.03	0.044	0.0294	0.041	0.031
	(0.034)	(0.034)	(0.035)	(0.034)	(0.033)	(0.034)
Area	-0.00015	0.00033*	0.00025*	0.0003*	-0.00022	0.00037*
	(0.00023)	(0.00019)	(0.00024)	(0.00019)	(0.00024)	(0.0002)
Ln(time)	1.607***	2.396***				
	(0.321)	(0.322)				
Time			0.302	1.292***		
			(0.271)	(0.435)		
Time2			-0.0043	-0.079		
			(0.033)	(0.055)		
Time3			0.00038	0.0014		
			(0.0011)	(0.0019)		
TD1					-13.36	-13.51
TD2					17.04**	12.2**
TD3					16.49**	16.19**
TD4					15.99**	15.94**
TD5					15.81**	17.23**
TD6					16.94**	18.13**
TD7					17.11**	17.15**
TD8					17.93**	17.73**
TD9					18.31**	17.18**
TD10					18.08**	18.54**
TD11					17.53**	19.85**
TD12					16.81**	19.11**
TD13					18.46**	19.16**
TD14					19.72**	18.42**
TD15					21.24**	18.84**
TD16					.	.
TD17					21.37**	.
TD18					.	.
Constant	95.38***	82.186***	101.42***	78.7***	87.48***	67.381***
	(5.86)	(6.89)	(7.78)	(7.151)	(8.42)	(7.51)
Observations	14224		14224		14224	

Robust standard errors are in parenthesis. *: p<0.1, **:p<0.05, ***:p<0.01. Column (1) is using log function as a baseline hazard, (2) is polynomial terms and (3) is using nonparametric form. Rent cost means rent in current region where individuals live with their parents, Rent index is price index of other counties and normalized by 100. Both measures are log-transformed. Ln(time) denotes log form of study years. Time denotes study years.Time2 and Time3 is squared and cubed value of Time respectively. TD1-TD18 is dummy of each study year.

1 to 19. Note that lines with hollow circles and filled circles indicate move-out to other county and move-out to within a county respectively[46]. Graphs show that a nonparametric baseline model describes data the most flexibly. However, a piecewise baseline function is chosen in the main estimation because no event was found in the last two time intervals among nineteen study years.

In all cases, the hazard of move-out to other county shows more fluctuation than that of move-out to within a county, and its level is generally higher than that of within-case as found in data. Graphs in piecewise and nonparametric baseline cases show that there are two-time intervals in which the hazard of move-out to other county is notably higher than other times. That is 4-5 years and 10 years of study years, which corresponds to age 20 and age 26 ($16 + 4$ and $16 + 10$). Those are matched to the time when young people graduate their high school and universities respectively. That is, when they have a higher chance of moving further and being away from parental home. In any case, we could find the hazard of move-out gradually increases, peaks at the $10th$ study years and decreases afterward.

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[46] These are derived by computing a prediction for each case and then averaging the predictions by outcome.

Fig. 3.7: Hazard of Move-out by various Baseline Hazard Functions
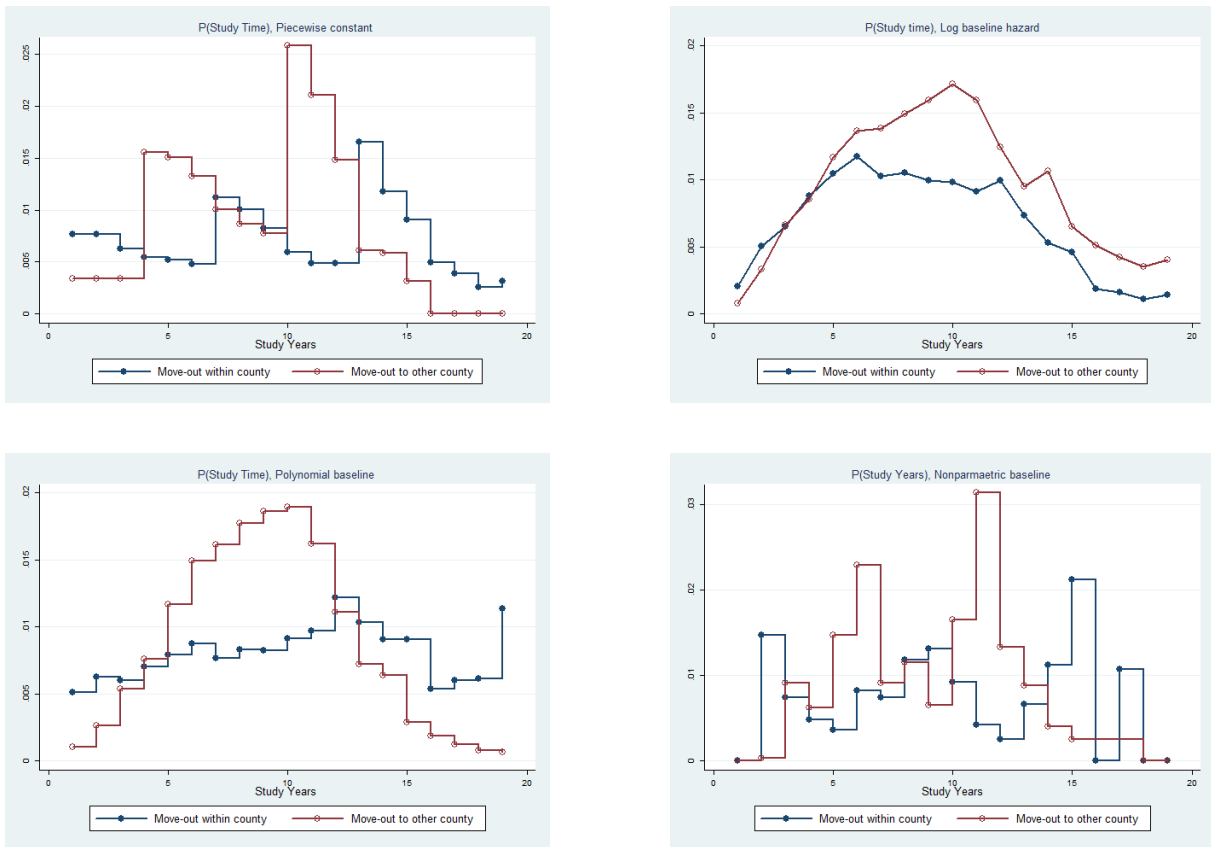
Source: SOEP V30, 2007-2010

3.6.2 Different Assumption on Attrition

In this section, the attritions are regarded as non-movers or dropped-out of data. Table 3.8 and Table 3.9 report the results of estimations with two different assumptions in the case of attrition. To consider time dependency more flexibly, results only with piecewise and nonparametric baseline hazard are reported in each table. The effect of time-related variables is unreported to save the space. Longitudinal weights are applied to all estimations, and the no-move status remains as the reference category.

Notably, the effect of rent variable shows a positive and significant effect on the decision on move-out from the parental home, irrespective of where they move to. It is a new finding that an increase in the current region rent increases the hazard of move-out to other county, indicating that there might be a crowd-out effect to some extent. However, the test result of IIA

assumption reported that the assumption is not violated, suggesting that the decision on move-out to other county is not relevant to that of move-out within a county. This new effect of the rent on the hazard of move-out to other county comes after the attrition cases are eliminated from the mover's group. Thus, when 'movers' are more strictly defined, the effect of the rent in the current place is significant. When people, whose whereabouts is uncertain, are assumed as movers, the significant effect of the rent in the current county on move-to other county disappeared as shown in a result of the main estimation. However, this paper sticks to the assumption 2) because it is not intuitive to assume that young children, whose parents have been participating in the survey on behalf of them, simply vanish from data when their parents still remain in the survey. Thus, this paper takes case 2) as the main argument but leaves this issue open.

The sign and significance of the rent variables are barely changed from those in assumption 2). The education variable shows a significant and negative effect here, suggesting that young people with lower education are likely to move out, probably for further education. The influence of parental characteristics are still robust. Notably, parental income shows a negative association with the hazard of move-out to other county with significance at the 0.01 level. It contrasts to findings in Table 3.6 where parental income has a positive relation with the hazard of move-out within the county. This result indicates that young people may get financial support from their parents when they move out within a county but not in a case of move-out to other county. Or young people are more likely to move out nearby their parents when parents are wealthier. Young people with less financial support may move to other county seeking better opportunities, like the young with lower income and education did as well, rather than remaining in the current region. Interestingly, the impact of the employment rate in the current county showed a negative association with the hazard of move-out to other county, implying that people residing in a county where the employment rate is higher and job prospects are positive are less likely to move to other county. The effect of the variable showed a negative sign as well in Table 3.6 but was not significant. This seems to appear due to age-related feature as young people are more flexible in moving around and changing the environment from where they get used to[47].

3.7   Conclusion

So far, this paper explored the factors of a move-out decision for young people and how housing costs affect the hazard of move-out from parent's place. In the results, it was found that housing

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[47] Results of multinomial logit without survival structure only for people over age 40 told the opposite story, that people with more income and education are less likely to move to other county.

Tab. 3.8: Case1: Multinomial Logit Estimation

Move-out decision	(1) Piecewise baseline		(2) Nonparametric baseline	
	Within	To Other	Within	To Other
Rent costs	-5.188***	3.012***	-5.834***	3.277***
	(1.763)	(1.036)	(1.892)	(1.008)
Rent index	-0.366***	-0.34***	-0.412***	-0.356***
	(0.054)	(0.042)	(0.065)	(0.041)
Education	-0.156**	-0.037	-0.172**	-0.443*
	(0.066)	(0.027)	(0.071)	(0.025)
Female	-0.204	0.035	-0.18	0.133
	(0.694)	(0.364)	(0.767)	(0.36)
Personal Income	-0.316	-0.048***	-0.308	-0.049***
	(0.22)	(0.016)	(0.218)	(0.016)
Household size	-0.189	-0.908***	-0.052	-0.961***
	(0.374)	(0.207)	(0.369)	(0.195)
Parent age	-0.168**	-0.186***	-0.163**	-0.209***
	(0.074)	(0.031)	(0.074)	(0.034)
Parent income	-0.017	-0.031***	-0.022	-0.035***
	(0.016)	(0.009)	(0.016)	(0.011)
Parent education	-0.092	-0.054	-0.104	-0.046
	(0.078)	(0.057)	(0.079)	(0.055)
Employment rate	0.129	-0.105*	0.133	-0.127**
	(0.079)	(0.06)	(0.099)	(0.057)
Foreigner	0.245***	-0.028	0.254***	-0.028
	(0.074)	(0.045)	(0.091)	(0.045)
Area	0.00024	0.00019	0.00021	0.00024
	(0.0005)	(0.00021)	(0.0005)	(0.00023)
Observations	14117	14117	14117	14117

Robust standard errors are in parenthesis. *: $p<0.1$, **:$p<0.05$, ***:$p<0.01$. Column (1) is the case using piecewise baseline hazard function and second column is the case where non parametric variables are used as baseline hazard. 'Within' refers to move-out within county (status=1) and 'To Other' move-out to other county respectively. Rent cost means rent in current region where individuals live with their parents, Rent index is price index of other counties. Both measures are log-transformed.

Tab. 3.9: Case 3: Multinomial Logit Estimation

Move-out decision	(1) Piecewise baseline		(2) Nonparametric baseline	
	Within	To Other	Within	To Other
Rent costs	-3.733**	3.072***	-9.633***	3.855***
	(1.488)	(0.562)	(2.303)	(0.929)
Rent index	-0.486***	-0.319***	-0.707***	-0.391***
	(0.063)	(0.027)	(0.012)	(0.038)
Education	-0.134***	-0.062***	-0.244***	-0.04
	(0.04)	(0.018)	(0.082)	(0.026)
Female	-0.239	0.359	-0.71	-0.028
	(0.504)	(0.235)	(0.939)	(0.341)
Personal Income	-0.195**	-0.087***	-0.293*	-0.053***
	(0.073)	(0.017)	(0.171)	(0.015)
Household size	0.031**	-0.939***	0.321	-1.057***
	(0.151)	(0.147)	(0.335)	(0.205)
Parent age	-0.104**	-0.192***	-0.181**	-0.246***
	(0.043)	(0.023)	(0.084)	(0.041)
Parent income	-0.027	-0.023***	-0.004	-0.031***
	(0.059)	(0.006)	(0.013)	(0.009)
Parent education	-0.027	0.007	-0.008	-0.032
	(0.059)	(0.033)	(0.073)	(0.056)
Employment rate	0.095	-0.095***	0.244**	-0.117**
	(0.073)	(0.03)	(0.12)	(0.057)
Foreigner	0.094	-0.03	0.362***	-0.052
	(0.071)	(0.026)	(0.124)	(0.039)
Area	-0.0006	0.00015	0.00014	0.00021
	(0.0005)	(0.00018)	(0.00088)	(0.00025)
Observations	13357	13357	13466	13466

Robust standard errors are in parenthesis. *: $p<0.1$, **:$p<0.05$, ***:$p<0.01$. Column (1) is the case using piecewise baseline hazard function and second column is the case where nonparametric variables are used as baseline hazard. 'Within' refers to move-out within county (status=1) and 'To Other' move-out to other county respectively. Rent cost means rent in current region where individuals live with their parents, Rent index is price index of other counties. Both measures are log-transformed.

costs play a significant role in young people's move-out behavior, and its effect was especially strong for people who consider move-out to within a county. The crowd-out effect was not found in the main estimation and was only significant when movers in data are strictly defined. The overall housing costs of the other counties, expressed as the rent index, decrease the hazard of move-out from the parental home in any case, regardless of where the young moves to. The negative effect was stronger in case of move-out to other county than that of within a county, and the unexpected effect on the latter was explained by the following reasons -1) The decrease in general housing costs reduces consumer confidence and 2) Moving to a new place might be decided by specific reasons bound to the region *e.g.* new job, more education, forming a partnership with someone- especially for young people who have many new starts ahead. These findings were robust against different applications of baseline hazard functions but showed small differences when attrition cases were not regarded as movers. However, this paper takes the case two's assumption in the main argument because young peoples attrition is most likely to be caused by a residential move from parent's household.

The results provide several implications. First, from the point of local government's view, it would be essential to stabilize housing costs for young people because it can be one of core factors to draw population from outside, and it helps them build their own households within the county. Findings from the estimation indicate that an increase in housing costs in a current region deters young people from moving out from the parental home within a county, and the relatively higher price in the current region even sends them away to another county - although this effect was significant only when a stricter assumption is imposed on movers. It suggests that young people might have formed their own households within the county if the housing costs they should endure in the current region are not relatively higher.

Second, Germany as a whole should also make an effort to maintain housing costs at a proper level. Or, targeting young people who prepare to build their own households could be an alternative solution as well. Although the market can serve young people's varied needs, policy framework can overlook the risk people take when making their first housing decisions. This suggestion comes from the finding that young people tend to stay at the parental home when overall rent index increases, which suggests that higher housing costs, in general, tend to discourage young people's movement. If one's preference is on 'a specific county' because of 'a specific reason', higher housing costs would delay one's move-out event from the parental home even longer.

Another important implication derived from the result is that family seems to be a crucial factor for young Germans in consideration of move-out from parental place. The negative relation

between parental age and the hazard of move-out has been shown consistently in all estimation, regardless of where they move to, indicating that young people tend to be around their parental home as parents are aging. The size of the effect was especially large in the case of move-out to other county, which supports this hypothesis. In addition, young people tend to move out to within the county when they have a large family whereas a large family decreases the hazard of move-out to other county. It shows a sort of family ties or duty for a family that young people are burdened by and assures the idea that young people are concerned about their family in a decision over move-out to a large extent.

Furthermore, young people's move-out seems not particularly related to their financial security. Though housing costs are mainly influential in the model, young people's higher income or their parent's higher income rather lowers the hazard of move-out to other county. Results rather highlighted that people with lower income, less job security, and less education are more likely to leave home and go to a new place. This can be explained as young people are moving out seeking better opportunities. Results in this paper show that current financial status is not really a decisive part for young Germans. In short, young people move because they seek a better opportunity for future not because they are financially secure enough to move out.

Several drawbacks need to be pointed out. First, it leaves much to be desired that affluent sample size was not available in research due to the limitation of observation years. Especially in the case of move-out within a county, the number of observations was so low when attritions are assumed as non-movers or dropped out of data, which results in empty cells in estimations. Taking the assumption on attrition from case two, the lack of observations are supplemented to some extent. However, it raised a question of how to deal with whereabouts of people in the next year in a case of attrition, and certain criteria had to be set up to determine their status. With different housing cost data which can provide sufficient observation years, this estimation can be extended using the whole SOEP survey years in the estimation. Then further research can also answer the question of how move-out behavior of young Germans has changed with respect to housing costs over decades.

In addition, the focus of this paper was on why young people move out from the current place but lacks the explanation about why they move to the 'specific' place. To exclude endogeneity issue, this paper limited the scope of estimation to the relation between the rent in the current county and a decision on move-out at next period. It is convenient but misses the drawing effects from the new county, which can be controlled with variables describing the county where individual i choose to move to. Admitting this restriction, this paper draws the main conclusion that young people in Germany are highly responsive to housing costs when they consider mov-

ing out from their parental home, and higher housing costs deter them from being independent from parents.

CONCLUSION

This study consists of two major themes. The first theme is a social benefit so-called "Hartz IV", which is covered in Chapter 1 and Chapter 2. The second is the move-out behavior of young Germans and is covered in Chapter 3. Both topics set out to verify behavioral responses of people who are regarded as a minority group in terms of economic/social status amid a series of social and economical change in Germany over the last decade. The first two chapters mainly deal with Hartz IV reform and try to examine its effect on people in labor market (Chapter 1) and take-up behavior of immigrants (Chapter 2). The last chapter extends interests to the young -so-called *Millenials*- and tries to verify the Easterlin hypothesis which argues that economic factors can deter young people from moving out from their parental home and from forming their own household. Concretely, issues in this thesis are narrowed down to the following three questions.

1. Did the Hartz IV reform affect household savings in Germany?

2. Are immigrants more likely to take up Hartz IV benefit than natives?

3. Do higher housing costs deter the young from moving out from their parental home?

The main empirical findings of these questions are chapter specific and were summarized within the respective empirical chapters -See Chapter 1.3, Chapter 2.4 and Chapter 3.5 for the empirical results in each chapter. The following paragraph summarizes the result of empirical findings that answer the study's main questions.

1. Did the Hartz IV reform affect household savings in Germany?

   - Households adjust their saving rate with respect to changes in expected benefit amount: When the expected amount of benefits increases by one unit, household decreases its monthly saving rate by 1.2-2 percent points depending on the specification.
   - Given a monthly saving rate is of interest, the size of the effect is non trivial.
   - The above result is robust for various applications.

2. Are immigrants more likely to take up the Hartz IV benefit than natives?

- Without considering an immigrant's unemployment status, the take-up rate of Hartz IV benefits are higher for immigrants than for natives.
- With the unemployment status taken into account, the effect of immigrant status on welfare take-up is halved.
- When the endogeneity of unemployment status is adjusted for, immigrants are not especially relying more on benefits compared to natives.

3. Do higher housing costs deter the young from moving out from their parental home?

- A relative increase in housing costs in current county deters young people from moving out from a parental place to elsewhere within the county.
- A relative increase in housing costs in other counties deters young people from moving out at all. Not only to other county but also to within the county.
- Results are robust against different assumptions on baseline functions.

Findings in the first two chapters highlight two aspects of how people perceive Hartz IV. First, Hartz IV reform induces people in work to be financially more responsible with respect to the decrease in expected benefits. To some extent, this is a contrast to negative views in previous research, in which the role of Hartz reform to activate the German labor market is often questioned. In terms of crowd-effect of state social welfare on private savings, this publication's conclusion is in line with Gruber's (2001), which also emphasized the role of precautionary savings identified by institutional differences in unemployment benefit system across the state in the U.S.

Second, immigrants are not taking advantage of the benefit system in the host country. The simple comparison of the welfare take-up rate between immigrants and natives in data only describes that immigrants tend to take up benefits more than natives because of their unemployed status. This result has been consistently found in literature in Germany[48], however, the endogeneity issue concerning unemployment status was specifically highlighted here. The finding that unobservable factors affect 'unemployment status' and 'benefit take-up' in the opposite direction makes the rampant belief that immigrants are remaining unemployed to abuse welfare program less reliable although it requires a cautious interpretation. Even though a direct comparison is not appropriate due to different social and economic background, previous research introduced in Chapter 2 [49] support this idea that immigrant status itself is not the cause of the

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[48] See Chapter 2.2
[49] Riphahn (2004), Castronova *et al* (2001), Bruckmeier (2011)

problem on the surface. Giulietti *et al* (2011)'s research supports this view. In a paper, they examined the relation between welfare generosity of a country and increase in immigration, and argued that the extent to which a country has a generous welfare program has a minor role in drawing immigrants to the county, unlike popular belief[50]. As OECD report puts it, "*Most immigrants, after all, do not come for social benefits, but to find work and to improve their lives and those of their families*".

The main argument in Chapter 3 is in line with concerns recently rising in many countries that more and more young people cannot afford housing costs to move out from a parental home. Findings in Chapter 3 support the Easterlin hypothesis that young people would postpone their lifetime decisions due to economic reasons. For example, it was verified in this research that the young tend to delay their move-out decision when housing costs, *measured in rent*, increase. Estimating this relation using German housing cost data was not explored yet by any researchers to the author's knowledge. However, as mentioned in Chapter 3.2, it is becoming an interesting topic for many scholars in the field from sociology to economics, and also draws interest from the public because it discloses young people's real life issues. Dividing move-out status into two different categories - 'Move out to within a county' and 'Move out to other county' was a necessary process in this study because the effect of housing costs on a single move-out decision shows no meaningful result at all without this differentiation. Specifying the effect of housing costs depending on where the young move to gave us a more enriched interpretation. So far, previous research did not specifically clarify where young people move out to in analysis, probably because their method is rather based on a macro-approach[51].

The first topic in this study gives a good tool to review the Hartz IV reform. First, it revealed that the Hartz IV reform meets its goal in a sense that it encouraged more effort at the household level to be prepared for income uncertainty. However, it also could be argued that government tried to pass down its burden onto its citizens using the institutional reform transmuting purpose of social benefit . This might be the reason that the reform had faced a lot of resistance from the population since its implementation. Results in Chapter 2 suggest an important implication about the future integration policy for immigrants. As shown, the higher take-up rate of the Hartz IV benefit among immigrants is coming from their unemployment status and less competitive skill-set needed for job market rather than their immigrant status. This provides a

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[50] Giulietti *et al* (2011), "While theory suggests that immigrants are more likely to move to generous countries, there is no strong empirical evidence that this is actually the case"

[51] For example, Farzanegan and Fereidouni (2014) tried to verify the effect of housing cost on regional marriage rate at province level. Mulder and Billari (2006) focused on the relation between home ownership and low fertility rate which does not require information of where targeted people move to.

lesson to us amid this immigration/refugee crisis in Germany and Europe as a whole: Without a measure to integrate immigrants into the job market in their host country, financial loss will inevitably follow and it will end up losing political support as well.

The last topic sounds an alarm to increasing housing costs and emphasizes the need for stabilizing future housing costs for the young. Although housing costs in Germany are at a moderate level and its rate of increase is not severe yet compared to other developed countries, findings in Chapter 3 warn that young people's residential independence is significantly affected by housing costs and it can impede other important life time decision of young people as well- *e.g.* forming their own family. This has been not illuminated as a social issue seriously in Germany. However, it is noteworthy that countries which failed to manage this issue for the young are paying quite a sizable cost afterwards[52]. In line with this implication, it is encouraging that there was a movement from the government side to pass the rent control law in 2015. Providing affordable accommodation targeting a certain age group-young people, for the time being, can be considered as well.

Hartz IV has been an interesting topic for many researchers since its implementation. Chapter 1 lies in a 'pro' reform side in a sense that it found a positive aspect of the reform in terms of public finance. Although consistent results are found in Chapter 1, a few things are left to be desired such as potential errors in the simulation process and a lack of information about unobservable factors. The issue in Chapter 2 is worth revisiting and expanding in near future as more immigrant data is accumulated. Results of this topic are hard to be generalized due to a different feature of each immigrant group and the cultural/economic background in host countries. Therefore up-to-date research and analysis in various countries will enrich the argument and can give valuable tools to handle an individual situation as well.

The last topic still leaves much to be explored with the affluent data set. This topic has been out of favour among scholars probably due to stable housing costs in Germany and its rather slow rate of capital increase. Understanding long term trends might be more dramatic in this case. With housing data for a longer time frame, it is expected to expand the interest to a longitudinal perspective to examine how this move-out trend has been changing over time. So far many institutions, *Bundesamt für Bauwesen und Raumordnung, BulweinGesa AG, GEWOS GmbH etc*, provide housing cost data which covers longer periods although access to these data is conditional and limited to some extent[53]. On the other hand, a recent study from the PEW

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[52] Cases of Asian countries are introduced in Chapter 3.2
[53] About information of data and its availability, see Hoffmann and Lorenz (2006)

research center[54] suggested that the trend that many young people live with their parents in the U.S longer than earlier generations might not arise solely from economical reasons showing that the proportion of the young living with their parents was lower in the Great Depression than that in today. This result suggested that a social/cultural cause may play an important role[55]. I expect that a new, interesting perspective could be produced from a different time period in Germany in further studies.

So far, the relation and interaction between a policy and behaviors of people were highlighted throughout three chapters. First, social/economic policy matters as it steers many people's lives in a certain way as shown in Chapter 1. Once a policy is set up, people take it as a restriction on their decision and adjust their behavior for their own interests. In Chapter 2, more fundamental reasons - why a certain group of people rely on social security more intensively and why they are more likely to be affected by it were revealed. Although there is no need for immediate action yet, Chapter 3 highlighted the potential future issue regarding higher housing costs for young people. As housing costs increase continuously and people's grievances are growing with respect to the change, policy makers will need to keep an eye on the market. Analyzing a policy and its effect requires caution as it forms a sort of law of human behavior. However, findings from research can be a tool to derive a more enlightened discussion of public policy and help the policy be better adopted as a result.

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[54] Richard Fry, 2016

[55] For example, the reports suggested the way young people perceive family and parents are different nowadays.

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SUMMARY

This cumulative dissertation consists of three contributions that empirically analyze behavioral responses of people in Germany amid a series of social and economical change over the last decade.

The first analysis "The Effects of Hartz IV reform on Precautionary Savings" aims to quantify the effects of labour market changes on saving behaviors of people in Germany, using the reform on unemployment benefit II system in 2005. This reform, so-called Hartz IV, reduced the expected amount of benefits of the eligible and faced a lot of resistance from citizens. This first chapter used this institutional change as a measure of income uncertainty which is the main cause of the precautionary saving behavior. Based on results from first difference regression and random effects Tobit model using GSOEP panel data, this analysis found an increase in the amount of benefit by one unit (1,000 Euro) decreases household's saving rates in a range (from 1.2 to 2 percent point) depending on applied specifications. Though the magnitude of estimated results is quite moderate compared to the results from previous researches, it was consistently found that there is a negative relationship between the amount of benefit derived from my simulation and household saving rate. The first chapter takes this result as an evidence that there exists a moderate precautionary motive in savings for German households.

The second contribution, "Immigrants and Welfare(Hartz IV) Take-up", moves its focus to immigrants. The central questions are whether and to what extent immigrants are more likely to take up Hartz IV benefit than natives. Disproportionately represented immigrants in welfare recipients are lifting concerns in many host countries that immigrants will become a fiscal burden and drain welfare resources. Despite the massive influx of immigration in recent years, this topic has been rarely visited so far in academic research. This paper fills the void by examining immigrants welfare take-up behavior in Germany using SOEP data (2007-2010). Among many socio-economic characteristics taken into account as factors of welfare take-up behavior of immigrants, individual unemployment status is especially highlighted as the most important factor. On the other hand, to resolve endogeneity problem that arises from unobservable

common causes for unemployment status and welfare take-up, this paper uses the individual eligibility status as an instrumental variable. This variable is derived from a simulation which is designed following descriptions in social code book (SGB II). From the consistent findings in specifications, the second chapter draws a conclusion that immigrants are significantly more likely to be unemployed, and that leads them to fall into the welfare trap. However, when the endogeneity is taken into account in the model, immigrants were not particularly more prone to take up benefits than natives.

The third contribution, "Housing costs and Household formation among Young Germans", examines how housing costs affect young people's decision on move-out from their parental home. A growing number of young people continue to live at home, with serious implications for their independence. This chapter pays attention to the increase in housing costs as an important factor of this trend and verifies the relationship between housing costs and move-out behavior of young Germans by modeling competing risks of the move-out event. In results, I found housing costs have a significant effect on young people's decision on move-out from the parental nest. When the rent in a county where they currently live with their parent increases, it decreases young people's hazard of move-out within the county given that the rents in other counties are fixed. On the other hand, the overall increase in housing costs in other counties also deters the young from leaving their parental home to live outside of their home county and additionally within. Also, this paper finds that family ties are an important concern for young Germans when they consider move-out, and current financial status does not particularly hinder them from doing so. Results are robust to various assumptions on baseline hazard function, but the significance of effects of housing costs on move-out behavior slightly varied depending upon how to define movers when attrition occurs.

GERMAN SUMMARY

Diese kumulative Dissertation, bestehend aus drei empirischen Beitrgen, analysiert Verhaltensreaktionen von Deutschen inmitten des sozialen und wirtschaftlichen Wandels im letzten Jahrzehnt.

Die erste Analyse "Die Auswirkungen der Hartz-IV-Reform auf die Vorsorgesparen" zielt darauf ab, die Auswirkungen von Arbeitsmarktveränderungen auf das Sparverhalten von Deutschen mit Hilfe der Reform des Arbeitslosengeldes II in 2005 zu quantifizieren. Die sogenannte Hartz-IV-Reform, reduziert die erwartete Leistungshöhe der Anspruchsberechtigten und sieht sich deshalb mit einer Menge Widerstand seitens der Bürger konfrontiert. Dieses erste Kapitel verwendet die institutionelle Veränderung als Maß für die Einkommensungewißheit, welche eine Hauptursache für das Vorsorgesparverhalten ist. Um das Problem mit Hilfe von Paneldaten des Sozio-ökonomische Panels (SOEP) zu adressieren, zeigen die Ergebnisse der vorliegenden Analyse auf Basis des First-Differences-Schätzer und des Tobit-Modells, dass eine Erhöhung der Leistungen um eine Einheit (1.000 Euro), die Sparquoten der Haushalte in einem Bereich (von 1,2 bis 2 Prozentpunkten) abhängig von den angewandten Spezifikationen verringert. Obwohl die Ergebnisse relativ moderat im Vergleich zu den Ergebnissen aus früheren Untersuchungen sind, wurde immer wieder festgestellt, dass es einen negativen Zusammenhang zwischen der Leistungsh—"ohe und der Sparquote privater Haushalte gibt. Das erste Kapitel nimmt dieses Ergebnis als Beweis für ein moderates Vorsorgeprinzip privater Ersparnis für deutsche Haushalte an.

Der zweite Beitrag "Einwanderer und die Aufnahme von Grundsicherung für Arbeitssuchende (Hartz IV)" zielt ihren Fokus auf Zuwanderer ab. Die zentrale Frage ist, ob und inwieweit Immigranten eher die Hartz-IV-Leistungen als die Einheimische in Anspruch nehmen. Trotz des massiven Einwanderungszustrom im letzten Jahrzehnt, ist dieses Thema bisher nur selten in der akademischen Forschung untersucht worden. Dieses Kapitel füllt diese Lücke durch die Untersuchung von Immigranten und deren Verhalten bei der Aufnahme von Arbeitslosengeld in Deutschland mit SOEP-Daten (2007-2010). Unter den vielen sozioökonomischen Merk-

malen, die als Faktoren in Betracht gezogen werden, wird der individuelle Arbeitslosigkeitsstatus als der wichtigste Faktor besonders hervorgehoben. Andererseits, um das Problem der Endogenität zu lösen, das sich aus nicht beobachtbaren gemeinsamen Ursachen für Arbeitslosigkeit und Inanspruchnahme von Sozialleistungen ergibt, wird in dieser Analyse der individuelle Anspruchsstatus als instrumentelle Variable verwendet. Diese Variable wird aus einer Simulation abgeleitet, die nach Beschreibungen des Sozialgesetzbuch II (SGB II) erstellt wird. Aus den konsistenten Ergebnissen zieht das zweite Kapitel die Schlussfolgerung, dass Immigranten signifikant häufiger arbeitslos sind und dass dies dazu führt, dass sie in die "Wohlfahrtsfalle" fallen. Wird allerdings die Endogenität im Modell berücksichtigt, waren Immigranten nicht besonders anfälliger für die Aufnahme von Sozialleistungen als Eingeborene.

Der dritte Beitrag "Wohnungskosten und Haushaltbildung bei jungen Deutschen" untersucht, wie sich die Wohnkosten auf die Entscheidung der Jugendlichen beim Auszug aus dem Elternhaus auswirken. Eine wachsende Zahl junger Menschen lebt weiterhin zu Hause, was schwerwiegende Folgen für deren Unabhängigkeit hat. Dieses Kapitel geht davon aus, dass steigende Wohnkosten diese Tendenz verursachen und konkurrierende Risiken des Auszugs unter jungen Deutschen erzeugen, um das Verhältnis zwischen Mieten und ihre Auszugsverhalten zu berprüfen. In den Ergebnissen wurde festgestellt, dass die Wohnkosten einen wesentlichen Einfluss auf die Entscheidung der Jugendlichen haben, aus dem Elternhaus auszuziehen. Wenn die Miete in einen Land steigt, verringert es die Chance, dass Jugendliche innerhalb des Landes ausziehen - angenommen dass die Mieten in anderen Ländern gleich bleiben. Die Gesamtzunahme der Mieten in anderen Ländern hindert die Jugendlichen auch daran, ihr Elternhaus zu verlassen, um außerhalb ihres Heimatlandes zu wohnen. Diese Analyse stellt fest, dass familiäre Bindungen ein wichtiges Anliegen für junge Deutsche sind, wenn sie einen Auszug in Erwägung ziehen, und die derzeitige finanzielle Situation sie nicht daran hindert. Die Ergebnisse sind robust gegenüber verschiedenen Annahmen der Ausfallsfunktion, aber die Bedeutung der Auswirkungen der Mieten auf das Auszugsverhalten variiert leicht je nachdem, wie man definieren, Mover, wenn Abrieb auftritt.