

# The effects of Hartz IV reform on Precautionary savings

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## **ABSTRACT**

Using the changes of reform on unemployment benefit II system in 2005 in Germany, this paper verifies precautionary motive in savings of German households. Based on first difference and random effects Tobit model using two years of panel data, it was found that increase in benefit amount by one unit (1,000 Euro) decreases household's saving rates by ranging from 2 to 2.98 percent point depending on the applied specification. Though this finding is quite moderate compared to previous researches, the result from various specifications led to a conclusion that there is a clear and consistent response of saving changes of households to the unfavorable benefit cuts.

**Keywords:** Social assistance, unemployment benefit, precautionary savings, Hartz IV

**JEL-Codes:** I38, E62, H55

# 1. Introduction

The decision on how much to save against income uncertainty is probably the most important economic decisions household should make<sup>1</sup>. According to a survey done with SAVE data<sup>2</sup> to German population, it was verified that together with the old-age provision motive, savings for unforeseen events is the most important savings motive for German household head<sup>3</sup>. And this savings, which occurs in response to uncertainty regarding future income, is the definition of precautionary savings that this paper attempts to verify.

The presence and importance of precautionary saving have been backed up by many researches theoretically. Carroll(1992) and Carroll, Dynan and Krame(1999), have argued in their papers that precautionary savings is an important driving force for consumption-led business cycle. Results from Simulations in Hubbard, Skinner and Zeldes(1994)'s paper also suggest that precautionary savings could account of almost half of the aggregate capital stock in U.S..

Whereas results from simulations studies have shown consistent results on precautionary savings, the results based on empirical researches are not clear-cut. The biggest reason of this mixed finding comes from various and different measures of income uncertainty. Depending on how gauge this income uncertainty in empirical works, findings from researches vary in wide ranges because measuring income uncertainty is not clear work and not defined in one way. As an alternative way of measuring income uncertainty, income variation was relatively widely used especially by Carroll and Samwick(1997,1998) and Kazarosian(1997). Using U.S panel data, they found a strong precautionary saving motive under the assumption that if the stock of wealth is positively related to income variations it can be interpreted as an evidence for the existence of precautionary saving. The results of estimates ranged from 30 to 46 percent of total wealth accumulation.

One of alternative methods is using subjective risk measure for income uncertainty. Lusardi(1997,1998) in her work, she verified the importance of precautionary savings using subjective risk measure from the University of Michigan Health and Retirement Survey. However, in her other works in 1997, which uses also subjective variables on earnings variance

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<sup>1</sup> Throughout this paper, 'precautionary saving' is defined as savings induced by income uncertainty.

<sup>2</sup> Information about the SAVE survey and how to download the data is available at [www.mea.uni-mannheim.de](http://www.mea.uni-mannheim.de).

<sup>3</sup> Michael Ziegelmeier(2009)

provided by the Italian Survey of Household Income and Wealth data, she addressed that precautionary saving is hard to be detected in data even though it is present.

Due to this difficulty in measuring income uncertainty, many researchers also attempted to adopt uncertainty proxy using variables such as the consumer's occupation, education, industry of employment and institutional changes. For example, based on the assumption that some occupations such as self-employed or crafts men are facing higher income risks than other occupations, Skinner(1998) tried to identify the presence of precautionary savings applying U.S data. In its result, however, it was revealed that there is little or no evidence for precautionary savings. Nicola Fuchs-Schündeln and Matthias Schündeln (2002) also measured income uncertainty using occupation groups which include civil servants that have a significantly lower income risk than the rest of population. After having controlled self-selection of risk averter into low-risk occupations, they found that precautionary wealth explains up to 25 percent of total wealth for German households.

As a paper which adopted the institutional changes as a proxy for income uncertainty, the work done by Engen and Gruber (2001) is representative. In the paper, they verified precautionary saving motive of households using the differences in the state-continent income stream available to workers through the unemployment insurance program in U.S. Based on the implications from simulation studies, they tested the hypothesis derived from simulation with empirical data and found that the presence of unemployment insurance in U.S has a crowd-out effect on private savings and the effect is reduced as income uncertainty increases. In its conclusions, it reveals that reducing unemployment insurance replacements by 50 percent would increase gross asset holdings by 14 percent.

In a sense that this paper uses institutional changes as a proxy for income uncertainty, it is in line with studies of Engen and Gruber (2001). Reform on unemployment benefit system in 2005 in Germany, so-called Hartz IV reform, is not only the independent changes in income risks but also is desirable as it is applied to all population and free from self-selection problem which previous researches tried to solve out. This reform has been controversial even before its enforcement due to the magnitude of changes it was supposed to bring in. As the unemployment benefit system is equally applied to each region in Germany, benefit amounts in different time (before and after reform) will represent the changes in income uncertainty instead of different benefits by each state. Hartz IV reform in 2005 was designed to reduce amount of

unemployment benefit by large and boost incentives to work for people who live on the benefits. As most of households faced reduced amount of benefits by reform when other conditions in household are equal, it is expected that people who are affected by the reform encounter enlarged income variances if they get unemployed. Thus, this paper starts from the idea that estimating how people change their saving behavior after reform, which changed their back-up financial sources negatively, will give us a clue for precautionary savings of German households.

Following this introduction, section 2 outlines details about Hartz IV as an institutional background. In section 3, data and specification will be presented. In section 4, results of estimation will be shown and in section 5, it will conclude the result of this research.

## 2. Institutional Background

Unemployment benefit system in Germany had been changed and revised continuously in a way of activating labor market and reducing moral hazard of unemployed. In this paper I cover the most recent reform-so called Hartz IV reform in 2005 and 2006 especially, which is the last series of Hartz reform. 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<sup>4</sup>, the reform consisted of four different kinds from Hartz I to Hartz IV. This fourth stage of reform was in effective 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 that benefit. It covers changes-mainly reduction- in unemployment benefit amount that unemployed people are expected to receive and stricter means-test on eligibility.

Until 2004, there were three pronged unemployment benefit system which consist of unemployment benefit, unemployment assistance and social assistance<sup>5</sup>. Unemployment benefit (UB) was a part of a compulsory form of insurance financed by contributions. Thus unemployment benefits were paid without any means-test. To be eligible for UB, one has to be

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<sup>4</sup> Jacobi and Kluge (2006)

<sup>5</sup> Throughout this paper, the term indicating benefit system will be denoted with its abbreviation. Before reform: UB: Unemployment benefit/ Arbeitslogengeld, UA: Unemployment assistance/Arbeitsloegenhilfe, 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.

registered as an unemployed in local labor office and not older than 65 years old. And one has to have worked for at least 12 months in the last three years and to be eligible for maximum entitlement period one has to have worked certain number of months in the last 7 years. The benefits for unemployed with at least one dependent child amounted to 67 percent of previous net earnings and to 60 percent for those without a child. This replacement rate to previous earnings remains unchanged after reform in 2006. The maximum duration of benefits was between 6 and 32 months depending on age and contribution periods.

After reform in 2006, the replacement rate remained same but eligibility criteria became tightened and maximum duration was reduced. Now, to become eligible for UB one has to have worked at least 12 months in the last 2 years and the maximum entitlement period depends on the number of months worked in the last three years. And only individuals older than 55 years are entitled to UB for more than 12 months. But even for this group the maximum benefit periods was decreased to 18 months from 32 months.

Changes in Unemployment assistance (UA) and Social assistance (SA) were more progressive. 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 is expired or when they were not eligible for UB in the first place due to their lack of contribution. The benefit of recipients amounted to 57 or 53 percent of their previous income depending on whether recipients have children or not. In principal, it was not time-limited but initially only granted for a year and then prolonged every year if another means test was passed and the claimant was younger than 65 years old<sup>6</sup>. Due to its generous benefits given that it is secondly method for people in long-term unemployment and financed by taxes, UA system had faced many criticism before reform. According to the paper by Jacobi and Kluve (2006), the unlimited duration of unemployment benefit payment was an extraordinary feature of the German unemployment benefit system, leading to replacement rates for long-term unemployed which were higher than in any other OECD country (OECD 2004) whereas replacement rates of short-term unemployed are comparable to other OECD countries.

Moreover, when one's calculated UA was below their social minimum due to their low previous earnings, it was possible for them to claim SA simultaneously to fill the gap<sup>7</sup>. Social

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<sup>6</sup> Schmitz and Steiner (2007)

<sup>7</sup> People who are eligible for UA but its amount is below social minimum could claim the differences to local

assistance (SA) was basically paid for people who cannot finance themselves and has no other benefit or income to keep social minimum for living. 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 amount of SA was always guaranteed for people who are eligible for UA, UA system widely perceived as too generous social benefit rather than unemployment benefits.

Starting from January 2005, UA and SA were combined in one system – so-called ‘Unemployment benefits II’. UB II is for people who are in need and able to work but cannot claim UB I. And those who are unable to work will receive social assistance but now unemployed are not a target for social assistance in any case as unemployed the term it means people who is seeking for a job, its term implies unemployed are the one able to work<sup>8</sup>. For simple structure of unemployment benefit system before and after reform, see <Table 1>.

**<Table 1> <sup>9, 10</sup> Unemployment benefit system before and after Hartz IV reform**

	<b>Before reform</b>		<b>After reform</b>
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 kids,	UB II	-Tax funded, means tested -Formal UA and SA were merged to UB2 which is

authority as UA was managed by federal labor department. Thus, there were people actually only receive amount less than 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.

<sup>8</sup> The eligibility for UA depended on a worker’s employment history. However, SA before reform was the basic safety net for all household in need regardless of their employability. UB2-Hartz IV benefit is targeted at employable persons. Household in need and not employable are pplied to social assistance (in SGB XII). As only employable persons are in our concerns for research, social assistance after reform was not considered.

<sup>9</sup> Bernhard Ebbinghaus and Werner Eichhorst (2006)

<sup>10</sup> From below, each benefit will be denoted as UB, UA, SA under old system and UB1, UB2, SA under new system for simplicity.

SA	53% , for people without kids)	newly designed for people who are capable of working
	-For whose income below subsistence level -Tax funded, means tested, flat rate, infinite duration	

The amount of UB II benefit is now limited to social minimum of household. The calculation of social minimum is more or less same as that of social minimum before reform which consists of standard benefits for each household member, housing costs and heating costs. Though standard rate of social assistance(295 Euro per month on average in 2004) is a bit less than new standard rate under new system(around 340 Euro per month in 2005), given that social assistance was allowed for one-time benefits used to cover atypical needs of a household and the average amount of the one-time benefits was included as a lump sum payment in the new standard benefits, we can conclude that if one-time benefits are taken into account, the standard benefit effectively did not change under the new system<sup>11</sup>.

The standard rate of UB II has been increased since its introduction in 2005. The table which depicts the structure of benefit in its early year is shown below <Table 2><sup>12</sup>. Overall, people who have been entitled to UA under the old system now faced decreased benefit by reform. When other things equal, the calculation simply gives them a decreased benefit from now on<sup>13</sup>. In following section, I show the process of simulation for “expected benefit amount” that people are expected to receive when they get unemployed and estimated how this benefit change induced by reform affect to saving behavior of households. Thus, more details on benefit system regarding calculation will be described in the next section. Due to the fact that UA/UB II system is not the first method that people can think of, it can be argued that its impact will be quite limited. However, I emphasize the role of this UA/UB II system on majority of household with following reasons. 1) Many of unemployed people are not eligible for UB I in the first

<sup>11</sup> Bruckmeier and Wieners (2011)

<sup>12</sup> The standard rate reached 347 Euro in 2007, 351 Euro in 2008, 359 Euro in 2010.

<sup>13</sup> Simulation studies (Schulte, 2004, Blos/Rudolph, 2005; Becker/Hauser, 2006) on the effects of the Hartz IV reform on the income of former recipients of UA showed that more than 60 percent of them faced income losses or even lost their entitlements, while the benefit level of foremer SA recipients was not affected.

place<sup>14</sup>, 2) Its average duration of use is also short/shortened.

<Table 2><sup>15</sup> Unemployment Benefit 2: Lump sum standard payment (SP)<sup>16</sup>

	Single or Single parent	Other household members		
		Children up to 14 years of age each	Children between 15 and 18 years of age each	Adults (19 years of age and above each)
	100% SP	60% SP	80% SP	90% SP
Western Germany inc. Berlin	EUR 345	EUR 207	EUR 276	EUR 311
Eastern Germany	EUR 331	EUR 199	EUR 265	EUR 298
<u>Additionally per household</u>				
Transfer for lodging and heating (If the preconditions are fulfilled), a limited additional payment of up to EUR 160 for gainfully employed 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 für Wirtschaft und Arbeit (2004)>

### 3. Data and Specification

#### 1) Basic Specification

To figure out how the reform and its benefit change affected to savings behavior of households, a simple specification was designed in equation (1). As a first difference model using two years of panel data, this model does not require complex data structures to be

<sup>14</sup> Using SOEP data, Schmitz and Steiner(2007) calculated that more than 30 percent before reform, and over 35 percent after reform of unemployed people were not eligible for UB I. 50 percent of them were eligible for benefit in duration between 1-12 months. They also reported the average entitlement duration of UB I for unemployed people only amounts 6-7 months, which makes UBII system more reliable for people in need.

<sup>15</sup> Wolfgang Ochel (2005)

<sup>16</sup> 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 receives 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](http://www.arbeitsagentur.de))

estimated – just aggregated data on policy outcomes and data collected before and after the intervention.

$$S_{it} = \alpha_i + u_t + \gamma B_{it} + \delta X_{it} + e_{it} \quad (t=0,1) \quad (1)$$

$S_{it}$  is saving rate which was calculated by dividing household savings by household income. I chose to use saving rates instead of saving scale because the underlying role of precautionary saving is to maintain a given living standard and the amount that people put aside every month as a portion of income is more reliable in this context. The analysis is based on household head though savings and income were collected at household level. To see the response of working population to the reform on unemployment benefit, only employed people are considered in analysis.

Using two years of panel data,  $t=0, 1$  indicates year 2002 and 2007 which represent before and after reform respectively. These years were specifically chosen as those are only years that surveyed detailed asset and wealth level of households. The continuous variable  $B_{it}$  is short for benefit amount of individual  $i$  at time  $t$ . Benefit amount of each individual at each time will be calculated based on policy description in the next section.

The coefficient  $\gamma$  is our main interest. It indicates the effects of benefit on saving rates and can be interpreted as an evidence of presence of precautionary savings when it has a negative value. In terms of Gruber's paper, this negative effect of welfare benefit on private saving is called "crowd-out effects" in a sense that generous public financed benefit leads to a decrease in private savings. In this case, as the benefit amount after Hartz reform was reduced for people who are affected keeping other things equal, it can be interpreted that the decreased benefits had stimulated households to increase the portion of savings to their monthly income.  $X_{it}$  is the set of exogenous control variables used in the basic specification includes the age, sex, marital status, region dummies, asset level, the number kids, race, and education of the individual. By controlling these factors, it is expected to exclude the influence of other factors on benefit changes and  $\gamma$  identifies the pure effects of benefit changes by reform on saving behaviors.

The most advantageous part using first difference model here 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  $Cov(B_{it}, \alpha_i) \neq 0$ , as long as time-invariant assumption holds. The fact that 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 data, how to control these factors in model was a crucial issue in previous literatures. In papers of Nicola Fuchs-Schündeln, Matthias Fuchs-Schündeln (2002) and Lusardi (1997), it is said that precautionary saving can be underestimated when risk aversion is not controlled in the estimation properly. Assuming that those unobservable factors are time invariant factors, the problem can be circumvented here using first-difference model<sup>17</sup>.

## 2) 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<sup>18</sup>. Variables in GSOEP include household composition, employment, occupations, earnings, health and satisfaction indicators<sup>19</sup>. 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 on private household wealth, providing new insights to this important issue. As information on asset and wealth is crucial here to decide eligibility of recipients in simulation later on and also important as a control variable, I took 2002, 2007 waves for a main analysis. Concerning assets, the interviewers are asked for the market value of 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 case of jointly owned assets, the personally owned shares were explicitly asked for. The fact that we can observe assets variable at individual level is especially useful here as means-test for UA/SA/UB II benefits investigates asset holding of household at individual level.

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<sup>17</sup> In empirical research using SOEP data, 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 individual is a time-invariant variable.

<sup>18</sup> For details, see e.g. Wagner et al.(2007) and the SOEP homepage at <http://www.diw.de/en/soep>.

<sup>19</sup><http://www.eui.eu/Research/Library/ResearchGuides/Economics/Statistics/DataPortal/GSOEP.aspx>

In the raw data, the total number of individual amounts to 279,007 observations. People in age between 20 and 60 were selected to avoid education and vocational training and retired periods. Only employed household heads were analyzed to more properly answer to the research question: how do people in working respond to changes in unemployment benefits by changing their saving level?

The dependent variable-Saving rate- is calculated by dividing household income with household savings. 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?”. Hence, it is not asked to report accidental savings but to report usual amounts intended for savings, including savings to acquire wealth for old age. As precautionary savings are savings in case of facing income uncertainty, using only gross savings seems adequate. In Gruber (2001), he explained the reason for not using net asset in this context as “Net assets reflect short run smoothing through consumption and loans.” And as illiquid asset cannot be used for consumption smoothing during the unemployment spell, that is also not considered in analysis. On the other hand, how much portion of income people would put aside to their account every month reflects people’s precautionary behavior relatively well in this context. Moreover, given that the periods for accumulating wealth are different to each individual due to differences in age and educations periods, it also seems more adequate to use monthly saving rate rather than wealth holding.

### 3) Calculation of Benefits: $B_{it}$

In simulating benefit amount, this section consists of the following steps. 1) Defining ‘household social minimum’ which consists of standard needs, housing and heating costs for SA before reform and for UB II after reform. 2) Calculating UA before reform 3) Defining benefit amount from a function  $\max(UA, SA)$  before reform and UB II after reform. Through this step we get expected benefit amount of households in both years. 4) For household 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 are expected to have positive benefit amounts.

First, household social minimum was basically calculated following <Table 2>. According to the relationship with claimants, household member receives different weight to standard rate of claimants. When reform was in effective in 2005, the standard rate between eastern and western Germany was applied differently as shown in <Table 2>. In 2007 summer, however, this standard rate in Germany was united in one regardless of region. As the data in use is retrospective, I used initial standard benefit calculation after reform.

Adding to the sum of standard benefits depending on household composition, recipients can also claim their housing cost. In housing support, 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 costs. Here I used a table of the upper rent limits provided by State Capital Munich<sup>20</sup> which describes maximum amount of rent that people can receive depending on the number of household members, apartment size and building age classes. All includes additional costs such as heating and warm water to amount of monthly rent. For simplicity, the maximum limit was chosen in housing support calculation as more than 50 percent of actual amount of rent and heating costs in data are missing. The upper limits used in calculation are shown in the <Table 3>.

**<Table 3> Upper rent limits in calculation<sup>21</sup>**

Upper rent limits <sup>22</sup>			
Number of persons	Apartment size	Max. m <sup>2</sup> 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

<sup>20</sup> [http://www.auslaenderbeirat-muenchen.de/publi/hartz/Hartz\\_englisch.pdf](http://www.auslaenderbeirat-muenchen.de/publi/hartz/Hartz_englisch.pdf)

<sup>21</sup> This upper rent limits vary according to the state and years reflecting inflation. This table possibly underreport upper limit given this table was made in 2002. However, rent limit guideline is not clearly open to 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 dummies and time dummies are properly added as control variables.

<sup>22</sup> 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. He can use the help of the working group for this.

6	95~110	11.00	1,012.00
7	110~135	10.23	1,063.49

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. The repayment installments are not taken over<sup>23</sup>. The amount of benefit is topped up at certain threshold so as not to provide excessive benefits. However, the support for homeowners is not clearly described in regulation and it is largely at the discretion of the SA agency. Thus, here I replaced home owner's housing support with upper limits for tenants from the above table. Finally, basic household need is generated by summing up total standard benefits in household and housing supports.

In the second step, unemployment assistance (UA) before reform is calculated. As UA is calculated based on individual earnings, monthly individual net income variable was used here. In this research, earnings until 4 years back were traced in case of the absence of income data. In case income is not tractable at all even after considering past waves, the observation was dropped out from the sample.

As the third step, the expected benefit that people would receive will be determined. Before reform, the social minimum benefit from step 1) and UA benefit from step 2) was compared and highest benefits will be expected to each person. After reform, however, only benefits from 1) will be provided.

In final step, the eligibility rule is applied. Not like contribution-based unemployment benefit I (UB I), people cannot claim unemployment benefit II when other sources of income is available. Wealth checks and income of spouse are mainly considered here. First, to be eligible for benefits, assets have to be used up to certain levels. Counted as wealth or assets is generally all kinds of property which belongs to the household members and which could be exploited economically. 200 Euro per year of life are 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 cash money, savings such as securities, building 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 maybe kept. From survey in year 2002, I considered net financial wealth for wealth check and if this amount exceeds the allowed exempt amount then regarded them as ineligible households.

<sup>23</sup>Questions and Answers on Hartz IV in Munich (2004)

The amount of protected life insurance was more or less same to this amount thus life insurance must always be used up if the repurchase price exceeds the abovementioned asset limits. 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 was known to be more generous than that under the previous reform. Before reform was in effect, the life insurance was only protected up to a limit of 1,279 Euro. However, in practice, life insurance seems flexibly exempt from eligibility criteria. For example, in 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 was over 8,000 Euro and maximum value even reaches 15,000 Euro. Again, these eligibility checks are highly at the discretion of the SA agency and results from simulation are not able to be precise. In previous research, the actual eligibility and simulated eligibility have been not matched precisely especially when asset check was brought into consideration. For these reasons, I did not take life insurance in GSOEP data into account and only considered net financial assets for wealth checks. As this can be less restrictive than actual eligibility rule, however, I also reported the result of estimation considering life insurance as a sensitivity check<sup>24</sup>.

Though one's financial situation and labor market status shows he is in need, one cannot claim the benefit if there exists third persons that are responsible for support the needs unit to which one is belonged. Concerning the definition of 'the needs unit', §7III SGB II<sup>25</sup> specifies who belongs to this group. In general, every person living in the same household is assumed to be part of the needs unit if the household budgeting is managed jointly. In this paper, I only considered spouse's income as household income in deciding eligibility because in GSOEP, it is not allowed to distinguish and separate multiple needs units for the simulation other than spouses<sup>26</sup>. Therefore, if partner's current earning is enough to cover social minimum of

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<sup>24</sup> The sensitivity of simulation model depending on how wealth and assets are taken into account is deeply discussed in Frick and Groh-Samberg (2007).

<sup>25</sup> Social code second book (Sozialgesetzbuch zweites Buch)

<sup>26</sup> 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 own children. Generally the burden of proof if one is not part of the needs unit rest at the person or households not the local authority. In practice, this entails that not every households needs to coincide with the actual needs unit subject to the SGB II (Anne Karina Zimmer 2010), again when it comes to eligibility we

household, I regarded him or her as an ineligible person for benefits.

After all these considerations, final sample consists of 5,467 observations with two years of panel. Simple data description is presented in <Table 4>.

**<Table 4> Descriptive statistics<sup>27</sup>**

Variable	Mean	Std. Dev.
Saving rates	0.0825	0.105
Household income	2747.81	1833.13
Spouse's income	663.73	1144.07
Individual earnings <sup>28</sup>	1656.16	1828.50
Rent (Tenant=1)	0.527	0.500
Gender (Female=1)	0.381	0.486
The number of kids	0.537	0.780
Couple (Couple=1)	0.618	0.486
Region (West=1)	0.745	0.436
Education (years)	12.931	3.195
Age	46.301	10.755
Net financial wealth	6731.79	75732.31

<Note>: In regression, household income, spouse's income and net financial wealth were all normalized by dividing 1,000

**<Table 5> The number of observations and mean value of simulated benefits**

	Ineligible	Eligible			Mean
	The number of obs	The number of obs	Household Type	Amount of benefit	
Before reform	2265	3211	Type 1	785.27	1016.48
			Type 2	676.54	

face the difficulties of sorting out due to the discretion of SA agency.

<sup>27</sup> Not reported in the table, 31 percent of final sample is single household, 32 percent is couples without children, 27 percent is couple with children, less than 10 percent of sample belongs to single with children households respectively.

<sup>28</sup> This is individual net income and spouses' as well. In estimation household income was controlled.

			Type 3	843.86	
			Type 4	868.58	
			Type 5	1283.11	
			Type 1	576.51	
			Type 2	532.57	
After reform	2503	2972	Type 3	580.24	870.66
			Type 4	535.47	
			Type 5	1209.31	
Total	4768	6183			10951
Changes in benefit		The number of observations		Proportion	
Increase in benefits		1225		0.224	
Decrease in benefits		1982		0.362	
Unchanged	Always ineligible		1618		0.296
	Same amounts		650		0.119

<Note: household type 1~5 are indicated as below type 1: Single without kids, type 2: Couple without kids, type3: Couple with 1 kid, type4: couple with 2 kids, type 5: single with kids respectively. Source: From own calculation using GSOEP>

<Table 5> describes the result of benefit amount simulation of people in final sample. From the upper table, the average amount of benefit was decreased after reform from 1016 Euro per month to 870 Euro. Details of benefits by household type are also presented in next column. As our earlier intuition, benefits of single household were reduced the most whereas the decrease of benefit of large household reduced by relatively small. As only the case that household heads get unemployed is taken into account here, calculated benefit of couple households is smaller than that of single households as 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 benefit because either they are holding higher assets above threshold or higher income of their spouses.

The incentive to decrease asset amounts or working hours of spouses was not considered in estimation for two reasons. 1) When it comes to eligibility rules regarding spouse's income or wealth holding threshold, the reform in 2005 barely went through changes compared to previous system. Rather, the asset threshold after reform had slightly increased. Life insurance and financial assets are more generously protected under the new system and even keeping vehicle

is also additionally allowed after the reform. Given that first difference is used as a main tool, I disregarded the concern by assuming potentially unobservable factors which make people more cautious about managing their assets-such as attitude toward risk- are time invariant. 2) Given the unemployment status is not realized to working people in sample, it is very unlikely to be the case that household heads reduce their assets and spouses reduce their works to be entitled for the case that they get unemployed which is unrealized and unpredictable even. Thus, change of behavior regarding asset accumulation or spouses<sup>29</sup> in this context are disregarded.

However, this paper admits that the fact that unemployment status 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 long time. Thus, I also reported the results from estimation which controls unemployment risk of household heads and spouses which were derived from probit estimation<sup>30</sup>.

The bottom of <Table 5> shows the composition of sample by their changes in benefits. Around 30 percent of sample was always ineligible in both periods and around 12 percent of people were expected to receive same benefits due to their low income before reform. And none of that group showed differences in family composition before and after reform.

To check the validity of simulation, comparison between actual and simulated benefits for actual recipients is presented in <Figure 1>. In our data, less than 7 percent of total observations are shown to receive the benefits (UA/SA or UB II<sup>31</sup>) each year and many among them are not reporting actual amount offered from local government. Among the cases where benefit amount was reported, some case does not seem to be valid reporting one digit amount of benefits. Despite the lack of data for comparison, the average amounts of benefits from actual recipients and simulation are quite close as shown in <Table 6>. This comparison is made only to people who report positive amount of benefits and that is why results from simulation has larger standard deviation. The correlation coefficients between reported amount and simulated amount reached around 0.5. It seems quite moderate however, but could be increased to 0.6 when only

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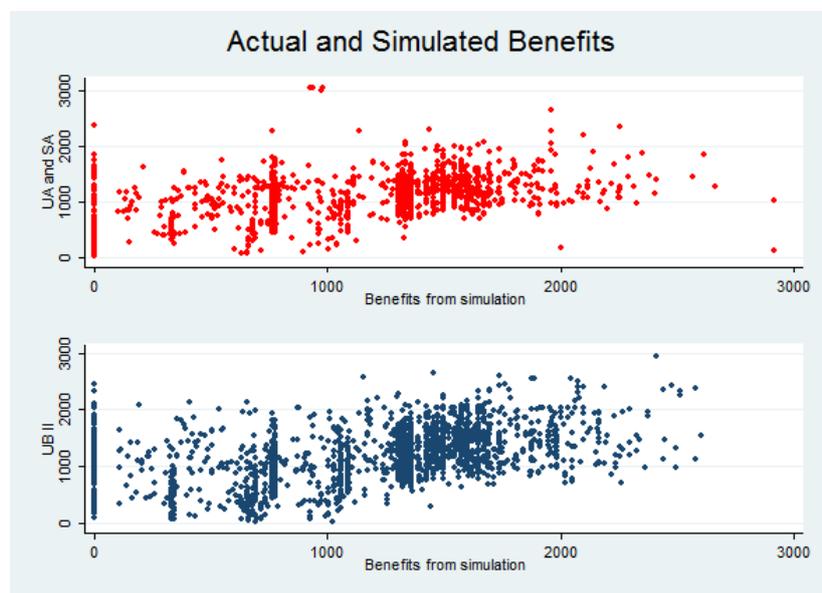
<sup>29</sup> Though this is not the case here, Cullen and Gruber (1996) have shown that the labor supply of wives of unemployed husband is strongly negatively correlated with unemployment benefits.

<sup>30</sup> Age, income, education, region, marital status and the number of kids, gender and nationality were used in the probit model. The result is not reported here.

<sup>31</sup> As recipients whose calculated unemployment assistance before reform is below social minimum can claim their extra benefit –Social assistance- to local agency separately, benefit amounts from two systems were summed up in a case where recipients reported positive amounts from both benefit systems.

positive benefit amount from simulation is used in calculation. It can be explained in part that asset threshold or household income threshold which agencies applied to in practice is by large at discretion. In data, around 10 percent of actual recipients were not eligible in simulation due to their other source of income. If this is the case where people underreport their asset or other incomes from the third party who are in the need units, moderate correlation and ineligible recipients in data can be somewhat explained.

<Figure 1> 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>

<Table 6> The Comparison between actual and simulated benefits

		The 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	Actual	3220	1066.33 (445.54)	29	2940	0.5226

reform	Simulated	3296	1003.04 (500.17)	0	2601
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<Note: Calculated only for actual recipients who reported positive benefit amounts to survey questionnaire.>

#### 4) Extended Model

In final sample, it was found that around 38 percent of saving data was missing because respondents participating in survey do not report negative saving amounts. Since our dependent variable is censored from below and our data have panel structure here, the random-effects Tobit model was applied based on the form in equation (2).

$$saving\ rate_{it}^* = u_t + \gamma B_{it} + \delta X_{it} + v_i + e_{it} \quad (2)$$

All coefficients denote same things as explained in equation (1) except a random effect  $v_i$  is considered in the model. The random effects  $v_i$  and error term  $e_{it}$  is assumed to be independent and identically distributed according to  $N(0, \sigma_v^2)$  and  $N(0, \sigma_\varepsilon^2)$  respectively. Again if  $\gamma$  has a negative sign, then it can be interpreted as an evidence of presence of precautionary savings.

Adding to the Tobit model as an extension, four robustness checks are implemented to make sure the effects in this paper. First, I consider the case where household head's spouse is also unemployed in model (1). In this case, benefit amounts for couples are expected to rise as spouse's income is not deducted. This case was not accounted in basic estimation as it is very unlikely to be the case that household and spouse both get unemployed at the same time. As a second sensitivity check, unemployment risk of spouses is considered by adding it to base line model. This check comes from the idea that spouse's job stability would also affect to household's saving behavior and should be controlled in the model. The unemployment risk here was proxied by unemployment probability derived from probit model. As a third, life insurance was included in consideration when eligibility is determined. When this criterion is applied, the number of eligible household heads is substantively reduced. At the last stage of sensitivity check, Heckman two-stage model was implemented due to a concern that using only sample of employees may induce selection bias because unobservable factors which affect to

both employment status and saving decision are likely to play a role.<sup>32 33 34</sup> If a selection is present then results without its consideration might induce bias.

## 4. Results

### 1) Basic results

Basic results are shown in <Table 7>. The first column is the result from the first difference model and the second one is from random effects Tobit model respectively. Though their main findings are more or less same, the Tobit regression, which models the underlying propensity to have positive savings, resulted in slightly larger coefficients than the associated coefficients in the first difference model. In both cases, however, it was verified that household's saving rate increases with household income and it decreases in accordance with spouse's income increases. The presence of kids in households has negative effects on saving rates regardless of their ages. The magnitude of effects is largest in case of kids aged over 19. Though its effect was not significant in first difference model, it was revealed that couple's saving rate is higher than that of single households. Adding to that, it was also found that people residing in west have lower saving rates than people in east. Estimated coefficients of education, age and financial assets all gave expected results and were all significant.

The benefit amount, which is our main interest here, shows highly significantly negative relationship with saving rates. According to the result from first difference model, increase (decrease) in benefit amount by one unit lowers (increases) the saving ratio by 2 percent point.

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<sup>32</sup> Using probability to be employed with probit model in the first step, Heckman's model can give us bias-free results adjusting potential presence of selection bias. In the first step of Heckman's procedure, probit model includes variables which are used in outcome equation and also added occupation variables for identification. By including estimated inversed Mill's ratio in outcome equation, it is expected to adjust potential selection bias.

<sup>33</sup> Basic setup is described shortly. Let's say employment status follow a basic selection equation:  $emp^* = A_i\alpha + u_i$  where  $emp = 1$  if  $emp^* > 0$ ,  $emp = 0$  if  $emp^* \leq 0$ . When we simply modify the basic outcome equation as  $S_{it} = \beta X_{it} + e_{it}$ , conditional expectation can be written as,  $E[S_{it}|only\ employed] = E[\beta X_{it} + e_{it}|A_i\alpha + u_i > 0] = \beta X_{it} + E[e_{it}|u_i > -A_i\alpha]$  and it gives a biased result when there is a correlation between  $e_{it}$  and  $u_i$ . By calculating the inversed mill's ratio,  $\lambda_i(\alpha_u) = \phi(\frac{A_i\alpha}{\sigma_u})/\Phi(\frac{A_i\alpha}{\sigma_u})$  where  $\alpha_u = -A_i\alpha/\sigma_u$  and inserting the ratio into outcome equation, selection bias can be handled. Here it is assumed that  $u_i$  and  $e_i$  are independent of the explanatory variables with mean zero and that  $u_i \sim N(0,1)$ . For more details, see Green (2003, 782p).

<sup>34</sup> 'Occupation' is the discrete variable consisting of 'blue collar/white collar/civil servant/military service/apprentice/freelancers/self-employed/family workers'.

Though benefit amount was normalized by dividing it 1,000, given that average saving rates of household was just around 8.25%, I conclude that the role of precautionary motive induced by the reform on 2005 on savings is not trivial. This approximation to the “Crowd-out” of savings driven by benefit changes by reform was consistently verified through different specifications.

The result from Tobit regression shows that the coefficient of benefit is -0.0331 and also significant at the 1% level. The calculation of the marginal effect indicates that saving ratio changes by 2.98 percent point<sup>35</sup> in response to one unit changes of benefit amounts. When rho is zero the panel-level variance component is unimportant, and the panel estimator is not different from the pooled estimator. A result of likelihood-ratio test, which is not reported here, formally compares the pooled estimator (Tobit) with the panel estimator. The results of rho value 0.42 and likelihood test showed that the result from Tobit estimation is different from result from pooled sample, which means censored data problem is not negligible.

**<Table 7> Basic regression results**

VARIABLES	(1) First difference	(2) Random Tobit
Benefits	-0.0204*** (0.00185)	-0.0331*** (0.00281)
Household income	0.0187*** (0.000631)	0.0266*** (0.000994)
Spouse income	-0.00304*** (0.00104)	-0.00568*** (0.00148)
The number of Kids	0.00207 (0.00544)	-0.000858 (0.00782)
Kids in age between 0~14	-0.0165*** (0.00565)	-0.0211** (0.00821)
Kids in age between 15~18	-0.0148*** (0.00461)	-0.0166** (0.00663)
Kids in age over 19	-0.0171*** (0.00168)	-0.0223*** (0.00258)
Couple	-0.00353 (0.00245)	0.00715* (0.00404)
Region (East 0, West 1)	-0.0112*** (0.00220)	-0.0103*** (0.00390)
Nationality (German 0, Other 1)	-0.00313 (0.00382)	-0.0153** (0.00697)
Sex (Male 0, Female 1)	-0.00563*** (0.00199)	-0.0110*** (0.00356)
Rent (Own 0, Rent 1)	-0.00970*** (0.00217)	-0.0114*** (0.00357)
Years in education	0.00200***	0.00395***

<sup>35</sup> Not reported in table.

	(0.000310)	(0.000545)
Age	-0.000280***	-0.000859***
	(0.000105)	(0.000175)
Net financial asset	0.0221***	0.0215***
	(0.00124)	(0.00182)
Constant	0.0594***	0.00824
	(0.00704)	(0.0121)
Sigma u		0.0878***
		(0.0018)
Sigma e		0.1034***
		(0.0013)
Rho		0.4192
		(0.0132)
Observations	10,909	10,909
R-squared	0.051	
Number of pid	5,467	5,467

<Note> Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Benefit amount, household income, spouse's income and net financial assets are all normalized by 1,000 in regression. Rho value of tobit model, that is the percent contribution to the total variance of the panel-level variance component, amounts around 0.42.

Various robustness checks were carried out and reported in <Table 8>. Results from first difference and Tobit model are reported for each model and marginal effects are reported in the table after estimation in case of Tobit specification. The coefficients of control variables are not reported in the table. As the results of <Table 7>, effects of main socio-economic characteristics such as household net income, net financial income and years of education on saving rates remained consistently significant in all specifications.

**<Table 8> Results from sensitivity checks**

	<b>Model (1)</b> Spouse unemployed	<b>Model (2)</b> Inc. unemploye nt risk	<b>Model (3)</b> Inc. Life insurance in eligibility	<b>Model (4)</b> Heckman two step model
<b>Benefits</b>				
First difference	-0.0105*** (-5.57)	-0.0119** (-2.66)	-0.00944*** (-4.02)	-0.0154 (-0.94)
Tobit model	-0.0230*** (-17.00)	-0.0264*** (-9.17)	-0.0264*** (-15.21)	
IMR				-0.0253 (-1.85)

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . T-statistics and Z-statistics for OLS and Tobit/Heckman estimation results are in parentheses respectively. Column (4) reports marginal effects in Heckman estimation. Included control variables are same as in basic results.

Results of all specifications above consistently show the strong evidence of presence of precautionary savings. Column (1) describes the result which is derived assuming the case where household head's spouse becomes also unemployed. When the expected benefit is calculated based on this assumption, the coefficient in model (1) is slightly smaller than that from basic specification. With caution of interpretation, this result leads us to a conclusion that crowd-out effects or saving behavior induced by changes in unemployment benefit can be mitigated when people face larger income risks due to spouse's unemployment. Model (2) is the result of specification which includes household head's unemployment risk as a control variable. Though the magnitude of coefficients slightly decreased when spouse's unemployment risk is considered in the model, main story from estimation had little difference from basic estimation. Coefficient of spouse's unemployment risk, which is not reported here, gives a positive sign but was not significant. Though potential measurement error of unemployment risk remains as limitation here, this paper take this result as a supportive evidence for our main results. When life insurance is controlled as a criteria of eligibility in model (3), the effect is somewhat smaller than that in basic estimation because now more observations likely to fall into ineligible cases due to stricter eligibility criteria. Those who still remain in the eligible group are now have lower mean saving rates, income and asset level than eligible groups in basic case and this change in composition could be the main factor for smaller effects of benefits on saving behavior. It implies analysis without considering life insurance can overestimate crowd-out effect on private savings. As noted earlier, interpretation of column (3) also remains incomplete due to the large discretion of SA agency. However, I could consistently verify that the effect of unemployment benefit is negatively related to saving rate.

Column (4) is added as the last sensitivity check. The result from Heckman estimation shows that selection bias that might arise by including only working population is not likely to cause an endogenous problem in this case. The coefficient of benefits in second stage estimation is not significant anymore in model (4). Concerning application of Heckman two-stage method, there are criticisms that it is somewhat hard to say much whether there is no selection bias when coefficient of lambda is not significant because selection equation is formulated by researchers.

However, from the repeated estimation using various different combinations of control variables in the selection equation, it was consistently derived that the coefficient of inversed Mills' ratio is insignificant. Therefore, I conclude the result derived by using only working population in basic estimation obtains validity. Through various sensitivity checks (1)-(4), I took these results as supportive evidences of a precautionary motive in saving behavior.

## 5. Conclusion

As noted earlier, the empirical tests of the precautionary motive have produced quite mixed results. The research in this paper uses the exogenous variation in income risk across individuals that arise from the reform on unemployment benefit II in Germany to test for the precautionary motive in saving behavior. Among many attempts to find a proxy for income uncertainty, using occupation characteristics upon different income risks they face or taking quasi-experimental frame adopting treatment and control groups have been widely used in previous literatures. Whereas this method can simplify problem and reduces researchers' works, it leads to the loss of many observations and entailed information with them. This research tried to take one step further by building simulation to calculate expected benefits that each person is supposed to receive and maximize information of institutional changes in German labor market in 2005. Based on the results from simulation, it was examined how people respond to benefit changes by adjusting their monthly savings throughout various specifications.

Starting from the first difference model basically, this paper verified the presence of precautionary savings consistently. The magnitude of the effect is quite moderate. For example, for a household head whose household income is 5,000 Euro, increase of benefit by 1,000 Euro per month leads to decrease in saving amount by 100 ( $5,000 \times 2\%$ ) Euro per month when the result from basic specification is applied<sup>36</sup>. However, given that monthly saving rates are used as a dependent variable and unemployment benefit II is not applied to everyone like public pension, this research put weights on the strong presence of precautionary motive which is identified by the Hartz IV reform in 2005.

Despite of the attempts to make benefit calculation as precisely as possible, this paper

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<sup>36</sup> Feldstein(1974) uses aggregate time series data from U.S and reported crowd-out effect ranging from -30~-50 per dollar of pension benefits 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.

admits that measurement errors which may come from the misreports of assets, income and discretion of government agencies in practice still remains. Moreover, though the changes of benefit system over two periods identify response of household savings, how they perceive unemployment benefit system in the first place as an alternative income source against their income risk is in question. Answering to this question entails finding out accurate measures for unemployment risks of individuals and independent variations of benefit system which was a Hartz IV reform in 2005 in this paper.

Though the findings here shows moderate changes in saving rate for households, I could verify a clear and consistent response of savings changes of households to the unfavorable benefit cuts. Though the effect of Hartz IV reform on job-taking incentives to the unemployed has been controversial according to previous researches since its introduction<sup>37</sup>, at least it was verified here that people perceive the benefit changes by the reform as enlargement of their income risk and prepare themselves by increasing private household savings. From a perspective of giving more financial pressure on the unemployed and weakening welfare dependency of them, it can be concluded that Hartz IV reform accords with the goal of policy which intended to rebuild competitive labor market environment to long-term unemployed.

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<sup>37</sup> Launov and Wälde(2013) showed that the Hartz IV laws had indeed no noteworthy impact on the decrease of unemployment in Germany. Just in contrast to that, the Hartz I to Hartz II reform appear to have been more helpful.

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