

The impact of job insecurity on the saving behavior of German households

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Abstract

This paper investigates the effect of job insecurity on the saving behavior of households in Germany using data from the 1992 to 2008 waves of the German Socio-Economic Panel. The results from fixed-effects estimations for the probability to save and the amount of monthly saving suggest that job insecurity in general is not a major saving motive in Germany. However, the analyses show that it is important to account for different household types, and household characteristics when empirically studying precautionary saving behavior. Among singles, household that worry about job security have a 14%-points higher probability to save. Among partner households, job insecurity has a positive effect on the saving of the under 30-year-olds. The estimation results also suggest that the high saving of households in Eastern Germany after reunification cannot be primarily attributed to job insecurity. Job insecurity is identified in three ways: self-reported worries about job security, a model-predicted probability of losing one's job due to dismissal or company closure, and the state unemployment rate. The latter macroeconomic indicator has a significant effect on household saving after the year 2000: a 1%-point increase in the unemployment rate raises the amount of saving by 2%.

Keywords: precautionary saving, job insecurity, household composition, subjective measures

JEL classifications: D12, D91, J64

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1 Introduction

Saving money for the future is among the most central economic decisions private households have to make on a monthly basis. Therefore, saving behavior has always been a major field of interest in economic research. While the complexity of the saving decision makes it basically impossible to develop only one general theory, researchers have always tried to disentangle the importance of certain factors that influence saving behavior. These include a great number of economic, psychological, sociological, and institutional factors. The most important factor is probably income since it first of all determines the ability to save. The focus of this paper is on the precautionary motive for saving, i.e., the effect of uncertainty regarding future income or expenditures on current saving. In particular, the impact of job insecurity on the saving behavior of households in Germany is investigated. This paper contributes to the existing empirical evidence by focusing on adaptation of saving behavior to changes in perceived job insecurity, and explicitly accounting for heterogeneity of households and household saving behavior.

The effect of job insecurity on saving in Germany is of special interest for two reasons. First, demographic change puts pressure on the public social security systems which are funded mainly through employee and employer contributions. The need for complementing private insurance has been addressed concerning old-age provisions and health insurance, but much less so for unemployment insurance. A lack of private savings can have very negative consequences for households that are hit by a job loss since unemployment is one of the main triggers of severe over-indebtedness of households in Germany (Keese 2009). Second, in times of increasing job insecurity, it is important to know if or to what extent people adapt their saving and thus their consumption behavior. The effect of a policy intervention to stimulate private consumption during a recession could be heavily dampened if households use the additional resources not for consumption, but for saving. For both aspects, one would expect that household characteristics have a strong influence on the impact of job insecurity on saving, e.g., through risk-sharing among households with two or more income earners (see Browning 2000, Mazzocco 2004).

Theoretical work and numerical simulations predict that even small amounts of income uncertainty can lead households to increase their savings substantially, which points to the importance of the precautionary motive in explaining individual as well as aggregate savings. Over the last twenty years, researchers have tried to confirm these predictions empirically (see, e.g., Browning and Lusardi (1996) for a comprehensive survey). Today, there exists a sizable number of empirical studies on the precautionary saving motive yielding very mixed results ranging from no importance to great importance of the precautionary saving motive. This inconsistency of results can be attributed to different measures for savings and uncertainty in the utilized data sets as well as several other methodological issues surrounding the empirical work, especially unobserved heterogeneity.

For Germany, there are studies by Fuchs-Schündeln and Schündeln (2005), Essig (2005b), Schunk (2007), Bartzsch (2008), Fuchs-Schündeln (2008), and Fossen and Rostam-Afschar (2009) that address the precautionary saving motive explicitly. This interest is not surprising since “Germany is an interesting country to study household saving behavior since it appears to contradict the familiar textbook version of the life-cycle theory of consumption and saving.” (Börsch-Supan and Essig 2003, p. 3) In particular, the generosity of the German public unemployment insurance and social security systems might significantly reduce the need for private savings to insure against income uncertainty arising from a possible job loss.

In the study at hand, data from the German Socio-Economic Panel (GSOEP) made available by the German Institute for Economic Research (DIW), Berlin, is used.¹ This annual longitudinal survey provides a large number of household and individual socio-economic characteristics that allow studying

¹The data used in this paper were extracted using the Add-On package PanelWhiz v3.0 (Nov 2010) for Stata. PanelWhiz was written by Dr. John P. Haisken-DeNew (john@panelwhiz.eu). The PanelWhiz generated DO file to retrieve the SOEP data used here and any Panelwhiz Plugins are available upon request. Any data or computational errors in this paper are my own. Haisken-DeNew and Hahn (2006) describe PanelWhiz in detail.

the link between job insecurity and saving behavior in great detail. In contrast to most existing work, the focus here is on the self-reported subjective perception of job insecurity. This subjective measure is also compared to a model-predicted probability of a job loss due to dismissal or company closure. The comparison shows that the subjective measure not only captures pure unemployment risk, rather it captures more broadly the worries of respondents regarding their future employment and economic situation, which increases its suitability to study precautionary behavior.

Some methodological problems surround the empirical estimations, in particular unobserved heterogeneity among households and the saving measure being left-censored at zero. In order to deal with these problems, two models are estimated: a fixed-effects logit model for the probability to save, and a linear fixed-effects model for households with positive saving. The findings cast doubts on job insecurity being an important saving motive for all German households. However, it significantly affects the saving behavior of singles, and young partner households. The results show that it is important to explicitly account for differences in household characteristics when studying precautionary saving behavior.

The remainder of the paper is organized as follows. In the next section, the existing empirical literature is briefly reviewed to highlight some of the major issues that surround the empirical work on precautionary saving behavior are addressed, focusing on the measurement of saving and risk. In section 3, the empirical strategy and the utilized data are described. The estimation results are presented in section 4. The last section concludes.

2 Empirical background

The choice between consumption and saving is at the very center of all economic decisions made by private households. Browning and Lusardi (1996) list a total of nine possible motives why people save, e.g., the precautionary, the life-cycle, the intertemporal substitution, and the enterprise motives. Not all motives give rise to the same amount of savings by each and every person. Depending upon preferences, income, age, etc. different motives will be of different importance to different people at different times. Disentangling the importance of one single motive is extremely difficult, mainly because they cannot be assumed to be independent of one another. Concerning the study at hand, “it is sometimes difficult to draw a clear-cut distinction between precautionary saving and other motives” (Browning and Lusardi 1996, p. 1821), e.g., savings for retirement could also be used to buffer against pre-retirement shocks.

This paper focuses on the precautionary motive because it seems to be one of the two most important motives, the other being the life-cycle motive. Börsch-Supan and Essig (2003) report that “Old-age provision” and “Saving as a precaution for unexpected events” are the two most important saving motives for German households.² They find that only 4% of the respondents judge saving as a precaution to be less important but almost 60% judge it to be of great importance. This result is confirmed here with data from the 2001, 2003, 2005, and 2007 waves of the German Socio-Economic Panel, in which households were asked if they had put any money aside for emergencies. Table 1³ reports the respondents’ answers.⁴ While the share of households that possess savings for emergencies has declined continuously from 78% in 2001 to 66% in 2007, the share of households that do not have these savings because of financial reasons increased from 77% to 89%. This hints at income constraints playing an important role for the explanation of non-existing precautionary saving behavior by many households. Combining these numbers, only about 5% of the households deliberately chose not to have any financial reserves for

²These results stem from the first wave of the German SAVE panel. Essig (2005a) confirms this result with data from the second SAVE wave.

³All tables in this paper were produced using Ben Jann’s estout-package for Stata (Jann 2005, 2007).

⁴The numbers are based on the same sample that is used for the econometric analyses later on. A less restricted GSOEP sample does not alter the results in a significant way. The observations are weighted using cross-sectional weights provided by the GSOEP making the descriptive statistics nationally representative.

emergencies, i.e., they report not to possess any savings for emergencies because of reasons other than financial ones.

TABLE 1: Possession of emergency savings

Question	2001	2003	2005	2007
	Mean,(St. Dev.),Obs.	Mean,(St. Dev.),Obs.	Mean,(St. Dev.),Obs.	Mean,(St. Dev.),Obs.
Any savings for emergencies? (1=yes)	0.76 (0.43) 6,019	0.69 (0.46) 5,899	0.66 (0.47) 5,452	0.64 (0.48) 5,578
No, because of financial reasons?	0.78 (0.42) 1,295	0.86 (0.34) 1,545	0.89 (0.32) 1,511	0.90 (0.30) 1,674

Note: Data weighted using cross-sectional weights provided by the GSOEP.
Source: GSOEP, own calculations

The beginning of empirical studies on the precautionary saving motive is marked by the work of Skinner (1988). Much of the empirical work has focused on the US and the UK. Only recently, Fuchs-Schündeln and Schündeln (2005), Essig (2005b), Schunk (2007), Bartzsch (2008), and Fossen and Rostam-Afschar (2009) have used data from Germany to study precautionary saving behavior. The empirical findings so far are widely mixed, ranging from none or only limited (e.g., Skinner 1988, Dynan 1993, Lusardi 1998) to great importance of the precautionary motive (e.g., Carroll and Samwick 1998, Ventura and Eisenhauer 2005). This mixed evidence might lead one to the conclusion that “while the precautionary motive is important for some people at some times, it is unlikely to be so for most people” (Browning and Lusardi 1996, p. 1838).

Another explanation of the different empirical findings might be the vastly different estimation strategies that were employed. Kennickell and Lusardi (2006) list eight potential “pitfalls and biases” that can arise when estimating precautionary saving. These include the measurement of wealth and risk, the underlying preferences, possible insurance mechanisms, functional specifications, and the influence of other saving motives. A study that “traces all of the sources of differences in conclusions to sample period, sample selection, functional form, variable definition, demographic controls, econometric technique, stochastic specification, instrument definition, etc.” (Browning and Lusardi 1996, p. 1822) does not exist and very likely never will exist.

The measures that have been used as the dependent variable by empirical researchers can be grouped into three categories: consumption, wealth, and saving.⁵ While the choice of modeling consumption, saving or wealth seems to be merely a matter of taste or data availability, there are distinct issues that relate particularly to each measure besides the issue of potentially great measurement error that is common to all of them. Measures of financial or total wealth are most prominent, and used by, e.g., Lusardi (1997, 1998), Carroll and Samwick (1998), Carroll et al. (2003), Kennickell and Lusardi (2006), Fuchs-Schündeln and Schündeln (2005). The main problem of wealth measures is the determination of the components (which differ in terms of liquidity and accessibility) to include when testing for precautionary savings. Fuchs-Schündeln and Schündeln (2005) find stronger evidence in favor of precautionary savings for measures of financial than for housing wealth, but Carroll et al. (2003) find a significant precautionary motive only for broad measures of wealth that include home equity which typically represents the largest component of wealth for most households. Apart from housing wealth, business equity is also difficult to deal with. Hurst et al. (2006), and Fossen and Rostam-Afschar (2009) study the saving behavior of entrepreneurs and find that pooling them with other population groups leads to artificially high estimates in favor of precautionary savings. The wealth stock is also heavily influenced by past events that are not observable in the data. Past shocks might have simultaneously depleted household wealth and raised income insecurity, which would bias findings against the precautionary motive. Kennickell and Lusardi

⁵Throughout this paper, the focus is on the flow of saving, i.e., the amount of money put aside during a time period. In contrast, savings are the stock of wealth that has been acquired at a certain time point. The saving rate is period saving divided by the respective period income.

(2006) use information about desired precautionary wealth from the US Survey of Consumer Finance and find evidence in favor of the precautionary motive but its quantitative importance seems to be limited.

Direct measures of the flow of saving have been employed by Fuchs-Schündeln (2008), Guariglia (2001) and Giavazzi and McMahon (2008) who all find a positive effect of income or policy uncertainty on saving. Many of the above mentioned problems of wealth measures also apply to saving measures, e.g., the type of saving to be included or the relevance of past events. The type of saving is especially important when using self-reported information as in these three studies because the respondents cannot be expected to calculate their saving “economically correct”. And typically, only positive saving values are observed which causes the dependent variable to be left-censored at zero.

Benito (2006), De Lucia and Meacci (2005), and Guariglia (2001) study the effect of job and income uncertainty on household consumption, and find evidence in favor of the precautionary saving motive even for the consumption of basic necessities such as food. This is somewhat surprising since variation in basic consumption goods can be expected to be fairly low. Different degrees of income elasticity of different consumption goods pose a problem to the estimation of precautionary behavior. Benito (2006) also studies the effect on durables consumption, and finds that purchases of durables are delayed when job insecurity increases.

When investigating precautionary saving behavior, the most important explanatory variable is the measure of uncertainty. “The central problem that faces anyone who wishes to determine the role of precautionary saving in this way is to identify some observable and exogenous source of risk that varies significantly across the population” (Browning and Lusardi 1996, p. 1835). Although income is not the only source of uncertainty that people want to insure themselves against, most research has focused on this particular type of risk. Kennickell and Lusardi (2006) see a strong need to move beyond earnings risk when studying precautionary behavior and Kotlikoff (1989) presents evidence that uncertainty concerning labor earnings as well as uncertainty concerning remaining life time and possible health expenditures can explain great amounts of precautionary savings in life-cycle simulation studies. The importance of expenditure risks, such as health and longevity, should not be underestimated, but they should be much less important for the explanation of saving in Germany than in, e.g., the US because of the German social security system which provides coverage for these major risks. Hence, the focus here is on income uncertainty, and in particular on the risk of becoming unemployed because unemployment represents the biggest threat to income for most households. Doi (2004) finds that unemployment risk but not income uncertainty helps to explain the increase of saving rates in Japan in the 1990’s. Other examples of studies that focus on the risk of job loss are Lusardi (1998), Carroll et al. (2003) for the US, and Benito (2006) and Guariglia (2001) for the UK. While the first two studies find significant but quantitatively limited evidence, the latter two find rather strong evidence for precautionary behavior due to job insecurity.

Perceptions of risk can be asked from the respondents directly or approximated using other available data. Several authors use the variance of observed income or consumption processes as risk measures. This approach has several shortcomings, the most important being that variation does not necessarily reflect risk (see Carroll et al. 2003, for a discussion). Bonin et al. (2007) criticize these measures for their endogeneity which stems from past choices and individual preferences. If risk aversion and prudence are positively correlated, people might at the same time choose less risky jobs and still save substantial amounts which would lead to a false rejection of the theory.⁶ Fuchs-Schündeln and Schündeln (2005) provide evidence for the presence of self-selection and a resulting negative bias regarding precautionary wealth. In contrast, Bartzsch (2008) argues that risk averse individuals save less than others.⁷ In

⁶Theoretically, under the assumption of constant relative risk aversion, constant absolute risk aversion or quadratic utility, prudence, risk aversion and intertemporal substitution are governed by the same parameter.

⁷This result could be due to the fact that this analysis is based on risk aversion regarding financial matters. However, self-selection should be based rather on risk aversion regarding occupational choice.

addition, a positive effect of the income variance on saving might not be due to precaution, but could well reflect intertemporal substitution.⁸ Subjective measures are more attractive but might suffer from respondents not understanding the questions correctly as they were intended. Guiso et al. (1992) were the first to use a subjective measure of income risk. They believe that “given the unobservable nature of households’ perceived uncertainty, there is no alternative as to rely upon direct survey information on the households’ subjective assessment of specific risks” (p. 309). Alessie and Kapteyn (2001) note the great potential of subjective risk measures for the understanding of saving behavior. A big advantage of subjective measures might actually lie in the possibility that respondents do not precisely answer to one isolated specific question, but include other associated aspects in their answers. Curtin (2003) argues that subjective unemployment expectations contain private forward-looking information as well as publicly available information on economic conditions which makes them useful as measures of future income uncertainty. People are probably not able to estimate the true risk of losing their job precisely, but their consumption and saving behavior should nevertheless be based on their expectations.

Private savings are not the only way to insure against income depletions caused by unemployment. There are several possible insurance mechanisms available to households, public unemployment insurance probably being the most important one in Germany. Gruber (1998) notes that unemployment insurance crowds out other insurance mechanisms, especially private wealth accumulation. Kotlikoff (1989) argues that public insurance institutions as well as risk sharing possibilities within families affect precautionary behavior. Browning (2000) discusses the saving behavior of two-person households theoretically and notes that more equal incomes of household members leads to less risk and less saving. In contrast, Mazzocco (2004) shows with data for the US that an optimal allocation of risk within the household can also lead to an increase in household saving. Freyland (2005) studies the saving behavior of different household types in Germany and reports that double earner households save significantly more than others, but the aspect of risk sharing is not addressed. The study at hand adds to the existing literature by looking at the relationship between saving, job insecurity and household characteristics. To this end, three household types are distinguished: singles, partner households with only one major source of income, and partner households with two or more income sources.

3 Econometric specification

3.1 Econometric models

The theory on precautionary saving behavior predicts that higher income or expenditure uncertainty leads to higher saving. The regression equation typically used to estimate precautionary saving behavior with panel data is specified as follows

$$S_{it} = \beta R_{it} + X'_{it}\gamma + \epsilon_{it} \quad (1)$$

where $i = 1, \dots, N$ indexes households and $t = 1, \dots, T$ indexes years. The variable S_{it} measures the saving of household i in year t . The variable R_{it} captures job insecurity of household i in year t . The vector X_{it} comprises all additional explanatory variables, mainly income, household composition and demographics, and individual characteristics. Finally, ϵ_{it} represents the error term. The included variables are detailed below.

For the data used here, the dependent variable - the amount of monthly household saving - is zero for about one third of all observations. Given this left-censored nature of the dependent variable, a

⁸Using the variance of income as a risk measure, one might also attribute the same measure of risk to different households with very different income processes, e.g., one with steadily increasing income, and one with steadily decreasing income.

linear regression model is inappropriate. Instead, a tobit or a sample-selection model might seem more appropriate. However, these models typically impose strong distributional assumptions on the data, and controlling for unobserved heterogeneity is difficult.⁹ But unobservable individual- or household-specific effects can be expected to be present and important for saving behavior, e.g., risk aversion.¹⁰ In order to control for left-censoring and for unobserved heterogeneity, two separate models are estimated: a conditional fixed-effects logit model for the probability to save at all, and a linear fixed-effects model including only households with positive saving.

This approach has three additional benefits: first, if income constraints bias results against finding evidence of precautionary behavior this effect should be less pronounced in the sample of households with positive saving. Second, the results from the logit model are less prone to measurement error that might arise from households reporting only certain specific monetary values, e.g., EUR 100.¹¹ Third, variables could impact differently on the probability to save and the amount of saving. For instance, entrepreneurs could be much less likely to save at all, but have significantly higher saving if they save.

The dependent variable of the conditional fixed-effects logit in the spirit of Chamberlain (1980) is a binary variable that is 1 if the household reports a positive amount of saving, and 0 otherwise. The latent variable specification of is

$$S_{it}^* = \beta R_{it} + X_{it}'\gamma + \alpha_i + \epsilon_{it}, \quad (2)$$

and the observation rule

$$\begin{aligned} P(S_{it} > 0) &= 1 && \text{if } S_{it}^* > 0, \\ P(S_{it} \leq 0) &= 0 && \text{if } S_{it}^* \leq 0. \end{aligned} \quad (3)$$

The term α_i represents the individual- or household specific effect. It must be noted that all observations with positive saving in all periods or no saving in all periods are disregarded. The model is only identified for households that change between saving and not saving at least once.

In the linear fixed-effects regression, the dependent variable is the natural logarithm of the amount of monthly household saving S_{it} (in real 2007 EUR). This transformation accounts for the highly right-skewed shape of the distribution of household saving that resembles the typical shape of an income distribution.

$$\ln S_{it} = \beta R_{it} + X_{it}'\gamma + \alpha_i + \epsilon_{it} \quad (4)$$

where again α_i represents the household specific effect.

3.2 Data

The availability - or rather a lack - of suited data on individual or household saving behavior and employment dynamics at the same time might be one of the reasons why there has not been very much research on the subject of precautionary saving in Germany until recently. The data for my analysis was made available by the German Socio-Economic Panel (GSOEP) at the German Institute for Economic Research (DIW), Berlin (see Haisken-DeNew and Frick 2005, for a detailed description of the dataset). One great advantage of this annual interdisciplinary study is its panel structure. Today, 25 consecutive waves from 1984 to 2008 are available for research purposes. Börsch-Supan and Essig (2003) stress that many aspects of saving decisions can only be understood by using longitudinal data, but most of the empirical studies so far focus on cross-sections. Browning and Lusardi (1996) suggest a minimum of two business cycles (approximately 15 years) as a sufficient survey period because findings from shorter

⁹For probit and tobit specifications, it is not possible to directly estimate fixed-effects models as in the linear case.

¹⁰Hausman specification tests of linear random- versus fixed-effects models estimated for the complete sample, and a sample that only includes observations with positive saving clearly reject the hypothesis that the error term is uncorrelated with the explanatory variables.

¹¹In fact, the distribution of monthly household saving is indeed clustered around specific values like 50, 100, 500, etc.

sample periods could be misleading due to common macro shocks. The saving measure that is used here has been available since 1992, which allows constructing an unbalanced panel with a maximum length of 17 years.

While the GSOEP data on employment characteristics and income are numerous and very detailed, data on consumption and saving are not. However, the studies of Fuchs-Schündeln and Schündeln (2005), Bartzsch (2008) as well as Bauer and Sinning (2005), Giavazzi and McMahon (2008), Fuchs-Schündeln (2008), and Freyland (2005) show that the GSOEP data can very well be utilized for the analysis of saving behavior. In the study at hand, household saving S_{it} is the self-reported flow amount of monthly household saving as used in the latter four studies mentioned above. The exact wording of this income screener-type question on household saving reads as follows:

“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?”

This is admittedly a rather simple approach to approximate the true amount of saving per time. Stein (2009) and Freyland (2005) discuss the problems that surround this measure in detail. These include, e.g., measurement error arising from individuals not defining saving in an exhaustive way, the monthly time-frame, or the left-censored nature of the data.¹² Nevertheless, this self-reported measure is well suited for studying precautionary saving behavior for two reasons. First, people not reporting their saving according to clear cut economic definitions might even be an advantage because this self-reported measure can be expected to capture reasonably well the amount of financial resources that people put aside and choose not to consume. Freyland (2005) finds evidence that homeowners do not include repayments of housing loans in their reported saving. If people do not report such regular saving, it can be argued that this measure captures better than others the amount of saving for no special purposes except unexpected or undesired events. Second, monthly net income and monthly saving are reported by the households directly one after the other. Therefore, the subjective perception of the fraction of income that is put aside every month should be quite accurate.

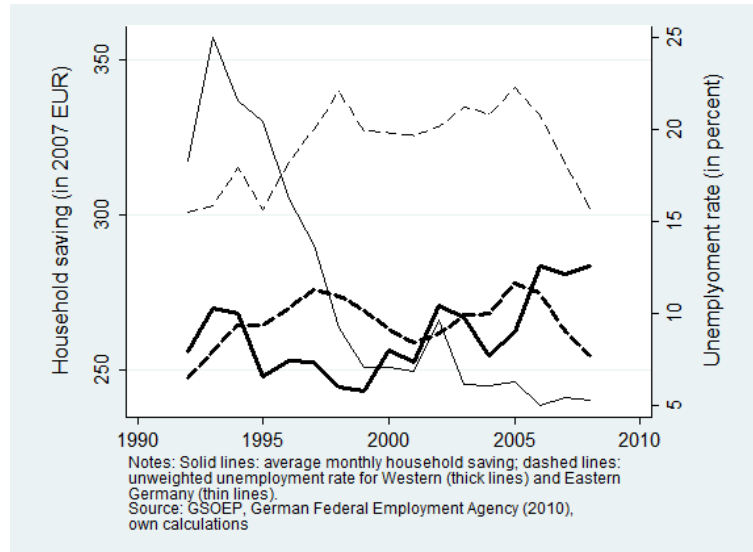
Due to the question design, no negative saving is observed. A value of 0 is attributed to all households that report not to put any money aside. Figure 1 plots the average amount of monthly saving and the average monthly unemployment rates in Western and Eastern Germany for the years 1992 to 2008. Comparing the corresponding household saving rate to that reported in the German national accounts or in the German Sample Survey of Income and Expenditure (EVS), it is found the GSOEP rates are on average about 2%-points lower. This difference is similar to that reported by Freyland (2005) and Bartzsch (2008), but significantly lower than those reported by Stein (2009). However, it is not the absolute level of saving that matters for the estimation of precautionary saving here, but the relative change from one period to the other. And the course of the saving measure over time accords reasonably well with the macroeconomic saving rates. In particular, high saving is observed among households in Eastern Germany after reunification, which has converged towards the Western German level by the late 1990’s. Fuchs-Schündeln (2008) shows that accounting for the precautionary saving motive is essential to reconcile the observed saving behavior with a theoretical life-cycle model. By looking at the development of the unemployment rates, one can infer that most likely only a forward-looking risk measure could explain the observed pattern because the rise in the unemployment rate occurs when saving is declining.

The risk measure R_{it} is based information about subjective individual worries about job security available for all waves from 1992 to 2008. The question reads as follows:

“What is your attitude towards the following areas - are you concerned about them? [...] Your job security? [the answers being] very concerned, somewhat concerned, not concerned at all.”

¹²In principle, the same criticism applies to wealth measures as used in Fuchs-Schündeln and Schündeln (2005) or Bartzsch (2008), too.

FIGURE 1: Monthly household saving and unemployment rates in Western and Eastern Germany, 1992 - 2008



This information is used to construct an indicator variable reflecting whether an individual is somewhat or very worried about job security, or not at all. The GSOEP includes another variable concerning job insecurity: the self-reported probability of becoming unemployed. In the years 1992 to 1994, 1996 and 1998, this question had 4 possible answer categories from “very unlikely” to “very likely”. Since 1999, the question has been included in the survey every two years with 11 answer categories ranging from 0% to 100%. The information on job worries is chosen for two reasons. First, it is available for a longer time period without any gaps, and the loss of variability is limited because the answers to the more detailed question on the probability of a job loss are clustered at certain values, in particular at 0% and 50%. Second, these two questions are positioned differently in the questionnaire. The subjective probability of a job loss is asked in the part on the employment situation and job characteristics at the beginning of the survey, whereas the subjective worries about job security is asked in the part on attitudes and opinions towards the end of the survey. Because of this framing, the former question could capture the pure risk of losing one’s job more accurately while the latter question could also capture other worries that surround the future employment and economic situation of the respondent. For the estimation of precautionary behavior, this can be seen as an advantage because it provides a more comprehensive view on personal economic uncertainty. However, an endogeneity problem could arise if low saving lead to more concern about the future economic situation.¹³ As discussed in section 2, subjective measures are best suited for the study of precautionary saving because they contain private forward-looking information. In order to check the robustness of the results, a model-predicted probability of losing one’s job due to a dismissal or a company closure is also used as a risk measures. In addition, all regressions include the unemployment rate of the household’s federal state at the month of the interview. This macroeconomic indicator can be seen as a fairly exogenous source of risk.

The richness of the GSOEP data allows the vector of control variables X_{it} to include a large number of income, household, personal, job, and financial and wealth characteristics in order to control for the most important aspects that influence household saving decisions, and to isolate the pure effect of job insecurity. In essence, X_{it} comprises basically the same variables as in most of the previous empirical work on precautionary saving (see Yieh and Chen 2000, for an overview). The most influential determinant of saving is income. This study uses the same income measure as Fuchs-Schündeln and Schündeln (2005),

¹³In the same question, respondents are also asked about their worries regarding the development of the overall and their personal economic situations. Hence, they can be expected to distinguish between job security and their economic situation to some extent, and endogeneity should be limited.

Bauer and Sinning (2005) and Freyland (2005): the self-reported household net monthly income which is reported by the households directly before the saving information. For the regression analyses, the natural logarithm of monthly household income inflated to real 2007 EUR is used. In contrast to many other studies, no measure of permanent income is used because the focus is not on life-cycle saving but on adaptation of saving behavior for precautionary reasons.¹⁴ Attention must be paid to the functional relationship between income and saving. Assuming a linear relationship could be highly misleading because a large fraction of the observations reports not to save at all. Therefore, dummy variables for being in the 1st, 2nd, 4th or 5th quintile of the income distribution in a given year are included. In addition, the share of the main earner's income in total household income, and the satisfaction with household income (on a scale from 0 to 10) are included.

Household composition has a strong influence on consumption and saving behavior (Freyland 2005). Here, the square root of the respective household size, and dummy variables that indicate if the household is married, has any children, has any children under the age of 4, owns a home, or resides in Eastern Germany are included. There is also a dummy variable included that reflects whether the household experienced any major change during the previous year (e.g., marriage, divorce, birth or death of a family member).

Regarding personal characteristics of the main income earner, age and dummies for being younger than 30 or older than 50 are included to allow for different saving behavior at different points in life. Additional variables are dummies for being female, being German, years of education, and satisfaction with health (scale 0 - 10).

Job characteristics include dummy variables for being a blue collar worker, an entrepreneur, or a civil servant (reference group: white collar workers). Especially entrepreneurs and civil servants can be expected to show very different saving behavior because they are not part of the German public unemployment system (see Hurst et al. 2006, Fossen and Rostam-Afschar 2009, Fuchs-Schündeln and Schündeln 2005, respectively). In addition, job satisfaction (scale 0 - 10), unemployment experience, and a dummy indicating whether the main earner thinks it would be easy to find a new job or not,¹⁵ and the state unemployment rate at the month of the interview are controlled for.

Financial and wealth characteristics comprise the annual household asset income, a dummy for being worried about one's personal economic situation, and the interest rate at the month of the interview¹⁶.

Finally, a dummy variables for the 1990's, and living in Eastern Germany in the 1990's are included to capture the immediate response of saving to the large shock of reunification. Table 2 provides an overview of all variables used in the empirical analyses. An even more extensive set of variables with more detailed information on job, household, and wealth characteristics that are available from 2000 onwards was tested. While many of the additional variables impact on household saving, none of the results concerning the original variables changed. However, restricting the sample to the years 2000 to 2008 changes the results compared to 1992 to 2008. Therefore, the empirical estimations are based on the full time frame and a slightly less exhaustive set of variables.

3.3 Sample construction

Since the saving data are only available at the household level but many of the explanatory variables - especially the measure of job insecurity - are recorded for the individual household members, one must attribute the individual characteristics to the respective household. Following the approach of Fuchs-Schündeln and Schündeln (2005), the household data is merged with the characteristics of the main

¹⁴Freyland (2005) argues that data on monthly income and monthly saving is not well suited to study life-cycle behavior.

¹⁵The information about the possibility of finding a new job are missing for 3 waves, and imputed using information from the preceding and following years.

¹⁶Effective interest rates of German banks for new households' deposits with an agreed maturity of up to 1 year

TABLE 2: Variable means by worries about job security

Variable	(1)	(2)
	Not worried about job security	Worried about job security
Able to save? (1 = yes, 0 = no)	0.72	0.63
Monthly household saving (2007 EUR)	295	209
Monthly household saving rate (Percent)	9.6	7.6
Monthly household income (2007 EUR)	2,923	2,558
Share in household income (Percent)	74	72
Annual household asset income (2007 EUR)	1,696	1,055
Satisfaction with income (Scale 0 - 10)	6.8	5.8
Worried about finances (1 = yes, 0 = no)	0.52	0.92
Predicted prob. of being dismissed (Percent)	2.8	4.5
Married (1 = yes, 0 = no)	0.58	0.60
Single household (1 = yes, 0 = no)	0.33	0.29
2-income household (1 = yes, 0 = no)	0.32	0.34
Household size (Number of household members)	2.5	2.7
Children (1 = yes, 0 = no)	0.37	0.41
Infants (1 = yes, 0 = no)	0.12	0.13
Change in household (1 = yes, 0 = no)	0.19	0.18
Homeowner (1 = yes, 0 = no)	0.43	0.38
Female (1 = yes, 0 = no)	0.31	0.29
German (1 = yes, 0 = no)	0.94	0.90
Age	41.83	41.59
Younger than 30 (1 = yes, 0 = no)	0.14	0.12
Older than 50 (1 = yes, 0 = no)	0.25	0.21
Years of education	12.6	12.0
Satisfaction with health (Scale 0 - 10)	7.2	6.7
White collar (1 = yes, 0 = no)	0.50	0.48
Blue collar (1 = yes, 0 = no)	0.25	0.43
Entrepreneur (1 = yes, 0 = no)	0.08	0.07
Civil Servant (1 = yes, 0 = no)	0.17	0.02
Satisfaction with job (Scale 0 - 10)	7.5	6.5
Unemployment experience (Months)	0.3	0.5
Easy to find new job (1 = yes, 0 = no)	0.28	0.11
State unemployment rate (Percent)	10.5	11.9
Interest rate (Percent)	4.4	4.0
East Germany (1 = yes, 0 = no)	0.11	0.23
Before year 2000 (1 = yes, 0 = no)	0.53	0.45
Observations	35,395	46,089

Note: Pooled data from 1992 - 2008, weighted using cross-sectional weights provided by the GSOEP.
Source: GSOEP, own calculations

income earner. The main income earner is defined as the person who has the highest net monthly labor income, i.e., higher than that of the partner or any other household member. For those households with two or more main income earners, the person who is the head of the household remains in the sample.¹⁷

The sample is restricted as follows in order to exclude households that might have very different saving motives and to make the findings comparable to previous studies. First, measurement error that arises through the utilization of self-reported saving and income measures is reduced: only households that report reasonable saving rates of less than or equal to 0.5 are included. Households that report unreasonably low income, i.e., less than EUR 500 per month, and those with extremely high income, i.e. more than EUR 20,000 per month, are excluded.¹⁸ Households in which the income share of the main earner exceeds 200% are excluded, and the income share is set to 100% for every remaining household with an income share above 100%.

Job insecurity being the main explanatory variable of interest, all individuals that are unemployed, apprentices, trainees or interns are disregarded. Focusing on the working population, only households whose main income earner is between the age of 18 and the age of 60 are included. Especially younger households might be relevant for the study of precautionary saving because these households have not yet established a buffer-stock of wealth and need to build up wealth to insure themselves against possible

¹⁷In addition, the main income earner has to be the head of the household, her partner or her spouse, and the household questionnaire must have been answered by the head of the household, her partner or her spouse. In the final sample, 75% are the household head, and 25% the partner.

¹⁸These values are based on the 1st and 99th percentile of the income distributions but less strict.

income downturns. Retired and older households are left out from the study because the focus lies on the risk of becoming unemployed, which does not exist for retirees.¹⁹

After further eliminating a few observations with missing values on one or more of the employed variables, the final sample comprises a total of 83,063 observations of 13,381 households over a maximum of 17 waves from 1992 to 2008. On average, households are observed for 6.2 years. Since the panel is unbalanced, two indicator variables for not being observed in the previous and the following year are included in the regressions to control for a possible bias arising from panel attrition.²⁰

4 Estimation results

Table 2 reports the mean values of the variables included in the regression analysis for those households that are not worried about job security, and those that are worried. The model-predicted probability of a job loss due to a dismissal or a company closure is in fact higher for the worried households (4.5% compared to 2.8%). The same applies to the state unemployment rate. The saving measures turn out to be lower for the worried households, e.g., the amount of monthly household saving by about 30%. Although this might seem at odds with the precautionary saving theory, it must be kept in mind that the worried households have a lower income (2,558 EUR compared to 2,923 EUR). They are also less satisfied with their income, and much more worried about their financial situation. Concerning household and personal characteristics of the main income earner, no large differences are observed. In contrast, the distribution of worries about job security across occupational groups is quite different: while basically no civil servants worry about losing their job, a lot of blue collar workers do. Households from East Germany are also more likely to be worried than their Western German counterparts.

4.1 Baseline estimations

For the baseline specification, the two saving measures - the dummy variable that reflects whether a household saves or not, and the log of monthly household saving - are regressed on the dummy variable for being somewhat or very worried about job security, and the set of explanatory variables described in section 3. Table 3 presents the results from random- and fixed effects logit estimations, and the results from random- and fixed-effects linear estimations including only households that report positive saving. As noted above, Hausman specification tests clearly reject the random-effects models. Hence, the interpretation here and the results presented in the subsequent tables focus solely on the fixed-effects estimations. However, it is reassuring that the results do not differ significantly between the random- and the fixed-effects models. This finding also suggests that no bias arises from disregarding all households that never report positive saving.²¹

The main result of interest is the effect of worries about job security on the saving behavior of the households. The results suggest that worried households are more likely to save than those who are not worried. However, the effect is quite small, the relative odds being 1.08, which translates into a 2%-points higher probability to save.²² In the linear model, no significant effect for being worried is found.

All other results accord reasonably well with economic theory and plain intuition. Households with

¹⁹The age of 60 instead of the official retirement age of 65 is chosen because of the possibility of early retirement. It must be noted though that in Germany, retired households save substantial amounts, contradicting the life-cycle permanent income hypothesis (see Börsch-Supan and Essig 2003). While this behavior cannot be explained by unemployment risk, it might reflect precautionary behavior with regards to uncertainty surrounding health expenditures and the length of life.

²⁰Regressions were also carried out on a balanced panel, and the results remain unchanged.

²¹These households as well as all households that always report positive saving are dropped in the fixed-effects logit model. In the linear model, they are excluded by the sample restriction imposed.

²²This calculation departs from the average share of households that save of 67%, and assumes that the probability to save increase for the group of the worried households by the same amount that it decreases for the other households.

TABLE 3: Determinants of monthly household saving -
Random- vs. fixed effects regressions

	Dep. var.: Able to save		Dep. var.: Log of saving	
	(1) RE Logit	(2) FE Logit	(3) Linear RE	(4) Linear FE
Worried about job security	1.096*** (0.031)	1.077** (0.033)	-0.010 (0.007)	-0.008 (0.007)
Log household income	3.421*** (0.334)	3.884*** (0.439)	0.833*** (0.024)	0.804*** (0.030)
Income quantile 1	0.493*** (0.030)	0.621*** (0.042)	-0.088*** (0.016)	-0.061*** (0.019)
Income quantile 2	0.797*** (0.031)	0.853*** (0.036)	-0.045*** (0.010)	-0.025** (0.011)
Income quantile 4	1.163*** (0.048)	1.143*** (0.051)	(0.010)	0.054*** 0.047*** (0.011)
Income quantile 5	1.108 (0.076)	1.136* (0.085)	0.117*** (0.016)	0.094*** (0.017)
Satisfaction with income	1.402*** (0.011)	1.310*** (0.011)	0.071*** (0.002)	0.060*** (0.002)
Share in household income	1.005*** (0.001)	1.006*** (0.001)	0.002*** (0.000)	0.002*** (0.000)
Household size	0.291*** (0.027)	0.436*** (0.051)	-0.385*** (0.025)	-0.356*** (0.034)
Married	1.280*** (0.063)	1.221*** (0.074)	0.049*** (0.014)	0.028 (0.019)
Single household	0.803*** (0.049)	0.929 (0.069)	-0.133*** (0.018)	-0.142*** (0.024)
2-income household	1.194*** (0.045)	1.189*** (0.048)	0.044*** (0.010)	0.049*** (0.011)
Children	1.138*** (0.049)	1.195*** (0.058)	0.029** (0.012)	0.052*** (0.014)
Infants	1.114*** (0.046)	1.050 (0.047)	-0.017 (0.012)	-0.033** (0.013)
Change in household	0.796*** (0.023)	0.841*** (0.025)	0.002 (0.007)	0.005 (0.007)
Homeowner	0.727*** (0.027)	0.465*** (0.024)	-0.050*** (0.011)	-0.183*** (0.016)
East Germany	1.638*** (0.142)	0.731* (0.127)	0.151*** (0.022)	0.005 (0.055)
Before 2000	1.086** (0.038)	1.011 (0.047)	0.055*** (0.010)	-0.007 (0.013)
East before 2000	1.651*** (0.101)	1.615*** (0.112)	0.186*** (0.017)	0.183*** (0.020)
Female	0.932* (0.036)	0.988 (0.049)	-0.012 (0.011)	-0.011 (0.014)
Age	0.994* (0.003)	0.993 (0.005)	0.001 (0.001)	-0.002 (0.002)
Younger than 30	0.984 (0.050)	0.954 (0.055)	0.052*** (0.015)	0.047*** (0.017)
Older than 50	1.195*** (0.059)	1.118** (0.062)	0.043*** (0.012)	0.023* (0.014)
Years of education	1.048*** (0.008)	1.029** (0.014)	0.023*** (0.002)	0.008** (0.004)
German	1.765*** (0.113)	1.049 (0.124)	-0.098*** (0.019)	-0.050 (0.047)
Satisfaction with health	0.983** (0.007)	0.976*** (0.008)	-0.004** (0.002)	-0.006*** (0.002)
Blue collar	0.834*** (0.033)	0.916* (0.047)	-0.033*** (0.011)	-0.005 (0.015)
Entrepreneur	0.549*** (0.031)	0.844** (0.062)	0.041** (0.016)	0.035 (0.024)
Civil Servant	0.923 (0.067)	0.746** (0.086)	-0.092*** (0.017)	-0.041 (0.029)
Satisfaction with job	0.966*** (0.007)	0.990 (0.008)	-0.012*** (0.002)	-0.009*** (0.002)
Unemployment experience	0.879*** (0.013)	1.004 (0.022)	-0.028*** (0.005)	-0.020** (0.009)
Easy to find new job	0.989 (0.034)	1.052 (0.040)	0.012 (0.009)	0.003 (0.010)
State unemployment rate	0.995 (0.007)	1.013 (0.009)	-0.003 (0.002)	0.005** (0.002)
Household asset income	1.000 (0.000)	1.000** (0.000)	0.000*** (0.000)	0.000 (0.000)
Worried about finances	0.631*** (0.021)	0.715*** (0.026)	-0.066*** (0.007)	-0.043*** (0.008)
Interest rate	1.020** (0.009)	1.029*** (0.011)	0.012*** (0.002)	0.013*** (0.003)
Non-response next year	0.885*** (0.027)	0.964 (0.032)	0.044*** (0.007)	0.026*** (0.008)
Non-response last year	0.887*** (0.028)	0.916** (0.032)	0.031*** (0.008)	0.019** (0.009)
Observations	83,063	49,876	56,040	56,040
Households	13,381	6,072	11,266	11,266

Notes: Columns (1) and (2) report odds ratios from panel logit regressions, columns (3) and (4) coefficients from linear panel regressions including only households that report positive saving, std. errors in parentheses. Significance levels: *10% **5% ***1%
Source: GSOEP, own calculations

higher income save more, and the effect is even increasing with income. Households from the top save more than 15% more than households from the bottom of the income distribution. Household saving also increases with income satisfaction, and if the main income earner contributes more to the overall household income.

Not surprisingly, saving decreases with household size, and is lower for singles than for partner households. Married households, and households with children save more while households with small children and homeowners save less.²³ Households in Eastern Germany in the 1990's save much more, which can also be seen in figure 1. Regarding personal characteristics, younger and older people save more than the 30- to 50-year-olds, Germans save less than households with a migration background, and health satisfaction has a negative effect, too.

Entrepreneurs, blue collar workers and civil servants save less than white collar workers. The latter finding lends some support to the findings of Fuchs-Schündeln and Schündeln (2005) who use civil servant-status as a risk measure to study precautionary savings. Job satisfaction and unemployment experience have a negative effect on saving while the chances of finding a new job rate does not have any significant effect. The negative effect of job satisfaction could also be very cautiously interpreted as evidence for precautionary behavior assuming that higher job satisfaction mirrors higher (perceived) job security. The state unemployment rate also has a significantly positive effect on the saving of households that report positive saving. A 2%-point increase in the unemployment rate (a reasonable change looking at figure 1) increases saving by 1%. Malley and Moutos (1996) find a slightly larger negative effect of the unemployment rate on the consumption of automobiles using US macroeconomic data. Since cars are durable goods, their consumption should be more affected than consumption in general (see Benito 2006). Therefore, the effects of the unemployment rate on consumption or saving found in Malley and Moutos (1996) and here match quite well, and lend further support to the hypothesis that job insecurity positively impacts on household saving.

The other macroeconomic indicator included, the interest rate, has a significant positive effect on saving, too: a 1%-point increase raises saving by about 1.2%. The included wealth measures have the expected effects: households that are worried about their financial situation save less (or better, households that save less are more worried), and those who have a higher asset income save more. Finally, the attrition dummies have negative effects on the probability to save, and positive effects on the level of saving.

As a robustness check, the findings for the self-reported worries about job security are compared to the estimation results of regressions that include a model-predicted probability of losing one's job due to dismissal or company closure (see section 2 for a discussion of the risk measures).²⁴ To this end, in a first stage, this event is regressed on a typical set of explanatory variables that include personal and occupational characteristics using a pooled logit model.²⁵ In the second stage, the predicted probabilities from the first stage are used as risk measures in the saving regressions.

Table 4 reports the results from the first-stage estimation in column (2) and contrasts them with the results from a pooled logit regression of being worried about job security on the same set of explanatory variables (column (1)). The determinants of dismissals or company closures are as one would expect. For instance, younger people, migrants, and blue collar workers are more likely to lose their job in this way. In contrast, civil servants, married people, and people with high job satisfaction are less likely to lose their job. It can be seen that the determinants of the two risk measures are quite different. While

²³This effect is due to mortgage payments as suggested by Freyland (2005). In a more extensive specification that included mortgage payments, the dummy for owning a home exerts a positive effect on saving whereas mortgage payments significantly decrease saving.

²⁴The analysis focuses on dismissals and company closures because these reasons for unemployment can be regarded as fairly exogenous. In general, entering unemployment can have very different reasons, many of them being endogenous.

²⁵Yearly cross-sectional estimations basically give the same predicted values.

TABLE 4: Determinants of subjective and objective job insecurity

	(1) Worried about job security	(2) Probability of being dismissed
Female	0.958* (0.024)	0.952 (0.036)
Age	1.006*** (0.002)	1.016*** (0.003)
Younger than 30	0.902*** (0.030)	1.230*** (0.078)
Older than 50	0.693*** (0.022)	1.037 (0.065)
Married	1.089*** (0.028)	0.833*** (0.034)
Children	1.011 (0.023)	1.053 (0.042)
Infants	0.939** (0.026)	1.010 (0.054)
Years of education	0.973*** (0.005)	0.954*** (0.008)
Migrant	1.191*** (0.061)	1.323*** (0.115)
East Germany	1.832*** (0.107)	1.011 (0.089)
Tenure	0.998 (0.002)	0.953*** (0.003)
Trained for occupation	1.126*** (0.024)	1.028 (0.034)
Temporary work contract	1.961*** (0.058)	1.016 (0.054)
Unemployment experience	1.052*** (0.011)	1.074*** (0.011)
Blue collar	1.195*** (0.032)	1.158*** (0.046)
Entrepreneur	0.932 (0.041)	0.776*** (0.052)
Civil Servant	0.198*** (0.012)	0.573*** (0.108)
Public sector	0.904*** (0.030)	0.578*** (0.039)
State unemployment rate	1.022*** (0.005)	1.031*** (0.007)
Satisfaction with job	0.836*** (0.004)	0.830*** (0.007)
Satisfaction with income	0.890*** (0.004)	1.000 (0.008)
Satisfaction with leisure	0.994 (0.004)	1.029*** (0.007)
Satisfaction with health	0.990** (0.005)	1.010 (0.009)
Pseudo R2	0.15	0.10
Wald chi2	8,836.85	3,821.57
Prob > chi2	0.000	0.000
Observations	147,446	131,821

Notes: Table reports odds ratios from pooled logit estimations, std. errors in parentheses adjusted for repeated observations of individuals. Regressions also include dummies for company size, industry, sector, years and GSOEP samples. Dismissals include company closures. Significance levels: *10% **5% ***1%
Source: GSOEP, own calculations

TABLE 5: Determinants of monthly household saving -
Subjective and objective job insecurity measures

	Dep. var.: able to save		Dep. var.: log of saving	
	(1) Worried about job security	(2) Probability of being dismissed	(3) Worried about job security	(4) Probability of being dismissed
Job insecurity measure	1.077** (0.033)	0.991 (0.006)	-0.008 (0.007)	0.003* (0.002)
Log household income	3.884*** (0.439)	3.859*** (0.446)	0.804*** (0.030)	0.810*** (0.031)
Income quantile 1	0.621*** (0.042)	0.613*** (0.042)	-0.061*** (0.019)	-0.056*** (0.019)
Income quantile 2	0.853*** (0.036)	0.848*** (0.036)	-0.025** (0.011)	-0.022* (0.011)
Income quantile 4	1.143*** (0.051)	1.148*** (0.052)	0.047*** (0.011)	0.045*** (0.011)
Income quantile 5	1.136* (0.085)	1.147* (0.088)	0.094*** (0.017)	0.091*** (0.017)
Satisfaction with income	1.310*** (0.011)	1.309*** (0.011)	0.060*** (0.002)	0.059*** (0.002)
Share in household income	1.006*** (0.001)	1.006*** (0.001)	0.002*** (0.000)	0.002*** (0.000)
Household size	0.436*** (0.051)	0.445*** (0.053)	-0.356*** (0.034)	-0.368*** (0.035)
Married	1.221*** (0.074)	1.209*** (0.076)	0.028 (0.019)	0.030 (0.020)
Single household	0.929 (0.069)	0.929 (0.070)	-0.142*** (0.024)	-0.142*** (0.024)
2-income household	1.189*** (0.048)	1.178*** (0.049)	0.049*** (0.011)	0.046*** (0.011)
Children	1.195*** (0.058)	1.216*** (0.060)	0.052*** (0.014)	0.053*** (0.014)
Infants	1.050 (0.047)	1.058 (0.048)	-0.033* (0.013)	-0.031** (0.013)
Change in household	0.841*** (0.025)	0.842*** (0.026)	0.005 (0.007)	0.005 (0.008)
Homeowner	0.465*** (0.024)	0.451*** (0.024)	-0.183*** (0.016)	-0.186*** (0.016)
East Germany	0.731* (0.127)	0.763 (0.135)	0.005 (0.055)	0.008 (0.056)
Before 2000	1.011 (0.047)	1.011 (0.048)	-0.007 (0.013)	-0.004 (0.013)
East before 2000	1.615*** (0.112)	1.577*** (0.111)	0.183*** (0.020)	0.180*** (0.020)
Female	0.988 (0.049)	0.978 (0.051)	-0.011 (0.014)	-0.009 (0.015)
Age	0.993 (0.005)	0.995 (0.005)	-0.002 (0.002)	-0.002 (0.002)
Younger than 30	0.954 (0.055)	0.967 (0.057)	0.047*** (0.017)	0.040** (0.018)
Older than 50	1.118** (0.062)	1.112* (0.062)	0.023* (0.014)	0.022 (0.014)
Years of education	1.029** (0.014)	1.026* (0.015)	0.008** (0.004)	0.008** (0.004)
German	1.049 (0.124)	1.053 (0.127)	-0.050 (0.047)	-0.046 (0.049)
Satisfaction with health	0.976*** (0.008)	0.978*** (0.008)	-0.006*** (0.002)	-0.006*** (0.002)
Blue collar	0.916* (0.047)	0.929 (0.049)	-0.005 (0.015)	-0.007 (0.015)
Entrepreneur	0.844** (0.062)	0.822*** (0.062)	0.035 (0.024)	0.031 (0.024)
Civil Servant	0.746** (0.086)	0.732*** (0.088)	-0.041 (0.029)	-0.033 (0.030)
Satisfaction with job	0.990 (0.008)	0.979** (0.009)	-0.009*** (0.002)	-0.007*** (0.002)
Unemployment experience	1.004 (0.022)	1.004 (0.023)	-0.020** (0.009)	-0.020** (0.009)
Easy to find new job	1.052 (0.040)	1.035 (0.040)	0.003 (0.010)	0.001 (0.010)
State unemployment rate	1.013 (0.009)	1.014 (0.010)	0.005** (0.002)	0.004** (0.002)
Household asset income	1.000** (0.000)	1.000** (0.000)	0.000 (0.000)	0.000 (0.000)
Worried about finances	0.715*** (0.026)	0.730*** (0.027)	-0.043*** (0.008)	-0.045*** (0.008)
Interest rate	1.029*** (0.011)	1.031*** (0.011)	0.013*** (0.003)	0.012*** (0.003)
Non-response next year	0.964 (0.032)	0.957 (0.033)	0.028*** (0.008)	0.028*** (0.008)
Non-response last year	0.916** (0.032)	0.938* (0.035)	0.019** (0.009)	0.018** (0.009)
Observations	49,876	48,163	56,040	54,838
Households	6,072	5,922	11,266	11,151

Notes: Columns (1) to (3) report odds ratios from fixed-effects logit regressions, columns (4) to (6) coefficients from fixed-effects linear regressions, std. errors in parentheses. Std. error of "Probability of being dismissed" not adjusted for being a generated regressor. Significance levels: *10% **5% ***1%
Source: GSOEP, own calculations

some variables have the same effect on the self-reported and the observed job insecurity measure, other variables have very different effects. On the one hand, the years of education, a migration background, unemployment experience, and the state unemployment rate among others have similar effects in both regressions. On the other hand, the age pattern, tenure, being on a temporary contract, and income and leisure satisfaction have different effects.

The results of the second-stage regression are reported in table 5 along with the previous fixed-effects estimates from table 3. The model-predicted risk measure has no significant effect on household saving. Since the standard error of this variable is not adjusted for being a generated regressor, its statistical significance is over-estimated. Adjusting the standard error would render the coefficient statistically insignificant. In addition, the economic significance is negligible, a 1%-point increase leading to 0.3% higher saving. All other coefficients remain basically unchanged.

4.2 Interaction expansions

The baseline estimations presented above provide some evidence for precautionary saving behavior due to job insecurity. However, by only including a job insecurity measure among the explanatory variables in the saving regressions, it is ruled out that job insecurity could have very different effects for different population groups. In order to allow for such effects, the self-reported worries about job insecurity is interacted with those characteristics that can be assumed to influence the relationship between job insecurity and saving.²⁶ There are a number of reasons why job insecurity could impact differently on saving, e.g., insurance possibilities, income constraints, or different consequences of a job loss.

Table 6 reports the results for the fixed-effects logit and linear regressions that include the interaction terms as additional variables. For brevity, only the odds ratios and coefficients for job insecurity, interactions, and the interacted variables are reported. Comparing these results to the previous ones, no significant differences appear for the overall effects. The dummy variable for being worried about job security increases in size, but is not statistically significant anymore.

Concerning income constraints, a result similar to that of Carroll et al. (2003) for the US emerges: households from the top of the income distribution respond more strongly to being worried than the other households. It can be assumed that these households are not constrained by income, and can thus more easily adapt their saving behavior. Here, they are found to save almost an additional 4% more than households from the middle of the income distribution in case that they are worried.²⁷ Concerning age, the finding of Benito (2006) that younger British households react more strongly to increased job insecurity is replicated here for German households. While overall, the under 30-year-olds have a significantly lower probability to save of about 4%-points compared to those aged 30 to 50, the odds ratio of 1.28 for those young households that are worried suggests that they even have a slightly higher probability to save than the 30- to 50-year-olds. Younger households could be more affected by job insecurity because they have not yet built up a buffer stock of wealth to insure themselves against income downturns. The finding that, in general, younger households save about 5% more than middle-aged households in case that they have positive saving further supports this idea. In contrast older households save generally more, but this difference almost completely vanishes if they are worried. Finally, it can be seen that single households save even less if they are worried, and that the effect of being worried on saving was stronger before the year 2000 when saving was generally higher, too.

Overall, the results still suggest that job insecurity does not represent a major saving motive for German households in general, but that it could be an important saving motive for specific population groups. This motivates taking a closer look at three specific aspects: the years before and after 2000,

²⁶In what follows, focus is just on the self-reported job insecurity measure because it is better suited to capture private employment risk as discussed in section 2.

²⁷Overall, households from the 5th quintile save about 8.6% percent more than those from the 3rd quintile.

TABLE 6: Determinants of monthly household saving -
Interaction expansions

	(1)	(2)
	Able to save	Log of saving
Worried about job security	1.201 (0.193)	-0.050 (0.041)
Interaction expansions of job insecurity with		
* Income quantile 1	0.903 (0.078)	0.007 (0.026)
* Income quantile 2	0.917 (0.064)	0.014 (0.018)
* Income quantile 4	0.990 (0.072)	0.011 (0.016)
* Income quantile 5	0.880 (0.075)	0.038** (0.018)
* Share in household income	0.998 (0.002)	0.001 (0.000)
* Younger than 30	1.281*** (0.102)	-0.012 (0.022)
* Older than 50	0.938 (0.066)	-0.033** (0.016)
* Single household	0.982 (0.075)	-0.053*** (0.020)
* 2-income household	1.036 (0.078)	-0.007 (0.018)
* Easy to find new job	0.980 (0.066)	-0.019 (0.017)
* East Germany	1.170* (0.111)	-0.021 (0.021)
* Before 2000	1.047 (0.062)	0.035** (0.016)
* East before 2000	0.892 (0.120)	0.028 (0.032)
Income quantile 1	0.663*** (0.059)	-0.067*** (0.025)
Income quantile 2	0.902* (0.056)	-0.034** (0.015)
Income quantile 4	1.154** (0.071)	0.041*** (0.014)
Income quantile 5	1.220** (0.107)	0.076*** (0.020)
Share in household income	1.007*** (0.002)	0.002*** (0.000)
Single household	0.936 (0.080)	-0.115*** (0.026)
2-income household	1.162** (0.072)	0.053*** (0.015)
East Germany	0.658** (0.122)	0.022 (0.056)
Before 2000	0.987 (0.056)	-0.024 (0.015)
East before 2000	1.740*** (0.209)	0.154*** (0.030)
Younger than 30	0.831** (0.060)	0.052** (0.021)
Older than 50	1.168** (0.084)	0.043*** (0.016)
Easy to find new job	1.067 (0.052)	0.010 (0.012)
State unemployment rate	1.012 (0.009)	0.005** (0.002)
Observations	49,876	56,040
Households	6,072	11,266

Notes: Column (1) reports odds ratios from a fixed-effects logit regression, columns (2) coefficients from a linear fixed-effects regression including only households that report positive saving, std. errors in parentheses. Regressions include all variables from table 3. Significance levels: *10% **5% ***1%
Source: GSOEP, own calculations

Eastern Germany before and after 2000, and the saving behavior of different household types.

4.3 Germany and Eastern Germany before and after 2000

Table 7 reports the results from separate regressions for Germany and Eastern Germany, each before and after the year 2000. The econometric specification remains the same as in the previous subsection. The results for all of Germany show that job worries strongly affected the probability to save of younger households before 2000. Overall, being worried does not seem to have an effect on household saving. Again, worried singles are found to save less. After 2000, households that moved between Western and Eastern Germany are found to have lower odds of saving in general, but relatively higher odds if they are worried. But these effects are only identified through movers. In order to investigate the saving behavior of these households in detail, the sample is split according to region and household types. Before turning to these estimation results, it is worth mentioning that the state unemployment rate has a significant effect on household saving since the year 2000. Combining the effects on the probability to save and the amount of saving, a 1%-point increase in the unemployment rate raises household saving by approximately 2%.

Looking at Eastern Germany only, no significant effect of job worries on household saving emerges, neither before 2000 nor after 2000. This contradicts the view that job insecurity plays a major role in explaining the high saving rates of Eastern German households in the aftermath of reunification. The group of households whose saving behavior has been most strongly affected by job worries in the 1990's are again the under 30-year-olds. However, these households had a much lower overall probability to save. The same reasoning applies to households from the bottom of the income distribution. While these households saved significantly less in general, being worried about job security worked against this negative effect, reducing it from -30% to -11% compared to households from the middle of the income distribution.

In general, it seems as if older households contributed a lot to the high saving in Eastern Germany before 2000, having a 12%-point higher probability to save. Interestingly, households from the top of the income distribution appear to have had a significantly lower probability to save. In Eastern Germany too, the unemployment rate has a significantly positive effect on household saving since 2000.

4.4 Household types

The last set of estimations is concerned with the impact of job insecurity on the saving behavior of different household types. This differentiation is particularly important because the number of households in Germany steadily increases and the average household size declines.²⁸ Hence, aggregate saving could be affected through this channel if job insecurity has different effects for different household types.

For this analysis, the households are classified into three different categories. A first distinction is made between singles and partner households. Singles are all individuals that do not live together with a spouse, partners are either married couples living together, or couples that are not married but living together. A second distinction is made among partner households according to the employment and income status of the two partners. If both partners are working and each contributing at least 25% to household income, they are classified as a 2-income household. If the partner of the main income earner is unemployed, retired, a trainee or in education, the household is classified as a 2-income household if the income of the main earner is less than 50% of the household income.²⁹ 1-income households are thus

²⁸In Germany, the share of 1-person households increased from 33.7% in 1992 to 36.1% in 2000 and to 39.4% in 2008, and is expected to reach 40.1% in 2020 (Destatis 2007, 2009).

²⁹These are only few cases. And while these households are falsely classified as having two labor incomes, the important aspect is that there is another important source of income, e.g., a pension or investment income, which could induce risk sharing.

TABLE 7: Determinants of monthly household saving - Germany vs. Eastern Germany

	Germany				Eastern Germany			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Able to save		Log of saving		Able to save		Log of saving	
	1992 - 2000	2000 - 2008	1992 - 2000	2000 - 2008	1992 - 2000	2000 - 2008	1992 - 2000	2000 - 2008
Worried about job security	1.270 (0.338)	1.357 (0.296)	-0.028 (0.062)	-0.066 (0.050)	0.623 (0.367)	2.264 (1.175)	-0.097 (0.129)	-0.048 (0.108)
Interaction expansion of "Worried about job security" with								
* Income quantile 1	1.025 (0.141)	0.831 (0.102)	0.045 (0.039)	-0.020 (0.035)	1.209 (0.346)	0.615* (0.165)	0.189*** (0.064)	0.033 (0.067)
* Income quantile 2	0.848 (0.095)	0.931 (0.090)	0.013 (0.027)	0.011 (0.022)	0.751 (0.186)	0.890 (0.202)	0.063 (0.046)	-0.023 (0.046)
* Income quantile 4	0.892 (0.106)	0.996 (0.099)	0.026 (0.025)	-0.009 (0.019)	0.866 (0.265)	1.146 (0.286)	0.001 (0.048)	-0.032 (0.043)
* Income quantile 5	0.894 (0.122)	0.881 (0.105)	0.040 (0.028)	0.023 (0.022)	1.026 (0.399)	1.200 (0.378)	0.044 (0.059)	0.013 (0.049)
* Share in household income	0.998 (0.003)	0.998 (0.003)	0.000 (0.001)	0.001* (0.001)	1.007 (0.001)	0.990 (0.007)	0.000 (0.001)	0.001 (0.001)
* Younger than 30	1.314** (0.152)	1.201 (0.146)	-0.028 (0.029)	-0.011 (0.033)	1.827** (0.479)	1.240 (0.331)	-0.032 (0.057)	-0.062 (0.066)
* Older than 50	0.809* (0.096)	1.040 (0.103)	-0.035 (0.025)	-0.018 (0.020)	0.664 (0.209)	1.290 (0.322)	-0.011 (0.043)	0.018 (0.041)
* Single household	0.806* (0.102)	1.078 (0.113)	0.005 (0.031)	-0.080*** (0.025)	0.599 (0.203)	1.697* (0.484)	0.081 (0.070)	-0.074 (0.060)
* 2-income household	1.136 (0.135)	0.851 (0.089)	-0.002 (0.028)	0.002 (0.023)	1.219 (0.317)	0.834 (0.207)	0.060 (0.052)	0.036 (0.047)
* Easy to find new job	0.987 (0.106)	0.993 (0.091)	-0.005 (0.026)	-0.034 (0.021)	1.566* (0.389)	1.345 (0.302)	0.039 (0.054)	-0.038 (0.046)
* East Germany	0.937 (0.112)	1.284** (0.141)	-0.023 (0.025)	-0.006 (0.022)	-	-	-	-
Income quantile 1	0.663*** (0.094)	0.737** (0.094)	-0.137*** (0.038)	-0.034 (0.034)	0.601* (0.184)	1.075 (0.319)	-0.296*** (0.077)	-0.067 (0.071)
Income quantile 2	0.998 (0.097)	0.931 (0.081)	-0.037 (0.024)	-0.025 (0.019)	1.187 (0.275)	0.943 (0.204)	-0.103** (0.048)	0.014 (0.044)
Income quantile 4	1.274** (0.125)	1.076 (0.092)	0.037** (0.022)	0.036** (0.017)	1.033 (0.283)	0.930 (0.210)	0.052 (0.049)	0.057 (0.042)
Income quantile 5	1.098 (0.153)	1.189 (0.149)	0.074** (0.032)	0.069*** (0.024)	0.456*** (0.176)	0.867 (0.284)	0.066 (0.075)	0.017 (0.058)
Share in household income	1.009*** (0.003)	1.007*** (0.002)	0.003*** (0.001)	0.001 (0.001)	0.999 (0.007)	1.010* (0.006)	0.004** (0.002)	0.001 (0.001)
Single household	1.086 (0.157)	0.882 (0.113)	-0.164*** (0.041)	-0.095*** (0.032)	1.531 (0.570)	0.804 (0.251)	-0.249*** (0.082)	-0.095 (0.073)
2-income household	1.193* (0.116)	1.272*** (0.111)	0.074*** (0.022)	0.034* (0.018)	1.194 (0.280)	1.334 (0.302)	-0.001 (0.047)	0.039 (0.040)
East Germany	0.848 (0.259)	0.637* (0.170)	0.252** (0.103)	-0.052 (0.071)	-	-	-	-
Younger than 30	0.900 (0.098)	0.854 (0.099)	0.034 (0.029)	0.013 (0.031)	0.527** (0.142)	0.945 (0.250)	0.048 (0.061)	0.073 (0.070)
Older than 50	1.214 (0.158)	1.162 (0.120)	0.019 (0.027)	-0.002 (0.021)	1.884* (0.658)	1.021 (0.273)	0.007 (0.053)	-0.035 (0.043)
Easy to find new job	1.094 (0.086)	1.082 (0.072)	0.027 (0.019)	0.007 (0.018)	0.686* (0.138)	0.849 (0.151)	0.007 (0.044)	-0.014 (0.036)
State unemployment rate	0.993 (0.016)	1.033** (0.014)	-0.010*** (0.003)	0.016*** (0.003)	0.993 (0.022)	0.995 (0.025)	-0.006 (0.004)	0.011** (0.005)
Observations	18,535	25,807	25,317	34,700	4,673	5,919	7,185	7,784
Households	3,021	4,211	7,372	8,828	745	981	1,887	1,984

Notes: Columns (1) and (2), (5) and (6) report odds ratios from fixed-effects logit regressions, columns (3) and (4), (7) and (8) coefficients from linear fixed-effects regressions including only households that report positive saving, std. errors in parentheses. Regressions include all variables from Table 3. Significance levels: *10% **5% ***1%

Source: GSOEP, own calculations

TABLE 8: Determinants of monthly household saving - Different household types

	Single households		1-income households		2-income households	
	(1)	(2)	(3)	(4)	(5)	(6)
	Able to save	Log of saving	Able to save	Log of saving	Able to save	Log of saving
Worried about job security	2.133** (0.748)	-0.086 (0.089)	1.258 (0.397)	0.093 (0.076)	1.159 (0.279)	-0.080 (0.053)
Interaction expansions: Worried about job security *						
* Income quantile 1	0.878 (0.167)	-0.005 (0.048)	0.972 (0.138)	0.018 (0.039)	0.955 (0.198)	0.082 (0.064)
* Income quantile 2	0.814 (0.131)	-0.009 (0.035)	1.114 (0.133)	0.029 (0.028)	0.824 (0.112)	0.022 (0.034)
* Income quantile 4	1.092 (0.199)	0.011 (0.034)	0.990 (0.134)	0.003 (0.028)	0.895 (0.108)	-0.004 (0.025)
* Income quantile 5	0.657* (0.153)	0.058 (0.043)	1.092 (0.180)	0.017 (0.031)	0.728** (0.102)	0.026 (0.027)
* Share in household income	0.995 (0.004)	0.001 (0.001)	0.997 (0.004)	-0.001 (0.001)	0.998 (0.004)	0.000 (0.001)
* Younger than 30	0.926 (0.160)	0.019 (0.038)	1.704*** (0.261)	-0.021 (0.047)	1.362** (0.207)	-0.030 (0.038)
* Older than 50	0.873 (0.156)	-0.073* (0.042)	1.156 (0.145)	-0.005 (0.027)	0.930 (0.111)	-0.011 (0.023)
* Easy to find new job	1.178 (0.188)	-0.068** (0.035)	0.949 (0.111)	-0.004 (0.029)	0.960 (0.120)	0.012 (0.028)
* East Germany	1.123 (0.265)	-0.046 (0.048)	1.341 (0.283)	-0.086* (0.047)	1.217 (0.181)	0.022 (0.030)
* Before 2000	0.797 (0.116)	0.042 (0.035)	0.981 (0.098)	0.017 (0.024)	1.349*** (0.153)	0.052* (0.027)
* East before 2000	0.640 (0.231)	0.077 (0.081)	0.865 (0.245)	0.059 (0.066)	0.832 (0.176)	-0.010 (0.044)
Income quantile 1	0.775 (0.157)	-0.119** (0.048)	0.704** (0.107)	-0.117*** (0.039)	0.563*** (0.116)	-0.082 (0.060)
Income quantile 2	1.031 (0.146)	-0.038 (0.029)	0.807** (0.085)	-0.060** (0.025)	0.968 (0.121)	-0.038 (0.031)
Income quantile 4	1.019 (0.150)	0.028 (0.028)	1.253** (0.140)	0.054** (0.024)	1.170 (0.128)	0.038* (0.022)
Income quantile 5	1.688** (0.391)	0.054 (0.045)	1.102 (0.184)	0.089** (0.035)	1.213 (0.186)	0.064** (0.030)
Share in household income	1.015*** (0.004)	0.003*** (0.001)	1.004 (0.003)	0.004*** (0.001)	1.006* (0.004)	0.002** (0.001)
East Germany	0.451* (0.196)	0.076 (0.105)	0.593 (0.260)	-0.044 (0.128)	0.395** (0.143)	-0.046 (0.090)
Before 2000	1.083 (0.154)	-0.023 (0.033)	0.957 (0.100)	-0.015 (0.024)	0.834* (0.090)	-0.042* (0.025)
East before 2000	2.220** (0.745)	0.057 (0.079)	1.335 (0.344)	0.112* (0.058)	2.077*** (0.393)	0.167*** (0.041)
Younger than 30	0.992 (0.160)	-0.006 (0.037)	0.681*** (0.093)	0.116*** (0.040)	0.838 (0.119)	0.070* (0.037)
Older than 50	1.125 (0.200)	0.078** (0.039)	1.000 (0.130)	0.036 (0.029)	1.109 (0.136)	0.007 (0.023)
Easy to find new job	1.054 (0.121)	0.041 (0.025)	1.171* (0.099)	0.006 (0.020)	1.023 (0.092)	-0.001 (0.019)
State unemployment rate	1.061*** (0.024)	0.006 (0.005)	0.984 (0.018)	0.005 (0.004)	1.009 (0.016)	0.004 (0.003)
Observations	8,653	11,174	15,479	20,409	15,985	24,457
Households	1,530	3,450	2,557	6,080	2,541	6,586

Notes: Columns (1), (3) and (5) report odds ratios from fixed-effects logit regressions, columns (2), (4) and (6), coefficients from linear fixed-effects regressions including only households that report positive saving, std. errors in parentheses. Regressions include all variables from Table 3. Significance levels: *10% **5% ***1%
Source: GSOEP, own calculations

all partner households for which the labor income of the main earner accounts for the main share of household income.³⁰

The most striking result of the analysis is that being worried significantly raises the probability to save of single households. The odds ratio of 2.1 is significant at a level of 5% and suggests a 14%-points higher probability to save for worried singles compared to not worried singles. For singles, good chances of finding a new job seem to act as an insurance mechanism, reducing the amount of saving by almost 7%. Older singles, despite saving more in general, save relatively less if they are worried. The state unemployment rate has a significant albeit small positive impact on the saving of singles, but not on the saving of partner households.

Among partner households, job worries primarily affect the probability to save of the young households. Households with two incomes saved significantly more before 2000 than after 2000. Similar to single households, the richest 2-income households save significantly more in general, but relatively less if they are worried about job security. Returning to the explanation of the high saving of Eastern German households in the 1990's, single and 2-income households in Eastern Germany saved significantly more during that time period.

5 Conclusion

This paper confronts the precautionary saving theory with micro-data from the German Socio-Economic Panel. The analysis relates self-reported and model-predicted measures of job insecurity to the saving behavior of German households. In order to account for unobserved heterogeneity of households and saving behavior, as well as for one third of all households that report not to put any money aside for emergencies, fixed-effects logit models for the probability to save, and linear fixed-effects models including only households with positive saving are estimated.

Overall, job insecurity does not appear to be a major saving motive for German households which is not all too surprising given the fairly generous public unemployment insurance system in place. However, the empirical analyses suggest that job insecurity significantly impacts on the saving behavior of certain population groups. Therefore, it is of great importance to account for this heterogeneity when empirically investigating precautionary saving behavior. In the paper at hand, it turns out that single households who worry about losing their job have a 14%-points higher probability to save than singles who do not worry. More generally, younger households under the age of 30 save relatively more if they worry about their job security. This is especially true for young households in Eastern Germany in the 1990's. These findings suggest that households who have not yet established a buffer stock of wealth are most affected by increases in employment and hence income risk.

The estimation results also suggest that the high saving of households in Eastern Germany after reunification cannot be primarily attributed to job insecurity. Besides young households and also older households, singles and households with two incomes saved significantly more in between 1990 and 2000 than after 2000. Since 2000, the state unemployment rate at the month of the interview is also found to have a significant effect on household saving, a 1%-point increase in the unemployment rate raising saving by approximately 2%. In total, the analysis presented points at labor market conditions not only affecting consumption and saving behavior via income changes, but also via changes in the consumption and saving behavior of private households.

³⁰The longitudinal consistency of household types is relatively high, the probability to remain in one type are 90% for singles, and 80% for 1-income and 2-income households.

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