

ifo Working Papers

Expectations and Saving Behavior: An Empirical Analysis

Stefan Arent

Ifo Working Paper No. 128

March 2012

An electronic version of the paper may be downloaded from the Ifo website
www.cesifo-group.de.

Expectations and Saving Behavior: An Empirical Analysis

Abstract

In this paper we analyze the impact of the expectations about future labor income on the saving behavior of German households. We measure expectations on an individual basis instead of generalized risk measures as it is common in existing studies. We use a unique panel data set on household savings. We find that that a higher unemployment expectation significantly decreases savings. However, we are not able to identify a significant relationship between general future income expectations and savings. Moreover, we find that good health expectations increase savings in Western Germany, but decrease the savings in Eastern Germany.

JEL Classification: D12, D14, D31, D84, D91.

Keywords: Income expectations, unemployment expectations, health expectations, saving behavior, savings.

Stefan Arent
Ifo Institute
Branch Dresden
Einsteinstr. 3
01069 Dresden, Germany
Phone: +49(0)351/26476-15
arent@ifo.de

1 Introduction

According to the intertemporal income smoothing motive of savings, people want to smooth their income and consumption over their lifetime. Therefore expectations about the future income influence the saving decisions of individuals and households [Aaron (1999)] Economic research has addressed this empirical question since the 1990s [e.g. Browning and Lusardi (1996), Guiso et. al. (1996, 2002)]. Short- as well as long-term uncertainties can affect the households' income and therefore the savings. In the short-term, households are faced with income uncertainty through the risk of becoming unemployed, in the long-term the retirement age and health risks may be unknown. Hence households save a share of the current income to increase the future consumption and therefore also reduce the future income risk. The scope of the previous empirical studies on this issue is limited. The majority of studies that examine the impact of uncertainty on savings use rough proxies such as income variation to measure the risk, [e.g. Lusardi (1998)]. The “mixed results of these studies may be at least partially attributable to the difficulty in calculating an exogenous measure of income uncertainty” [Engen and Gruber (2001) p. 550]. Using alternative proxies for risk (e.g. unemployment rates) cannot solve this problem definitively [e.g. Carroll et al. (2003) or Engen and Gruber (2001)].

Until now the impact of the (income) expectations on the saving behavior has not been studied. This is due to the limited availability of data (sets), which contains microeconomic information about both individual expectations and saving behavior. One exception is the study by Guiso et al. (1996), which examines whether the expectation of future borrowing constraints affects the savings of Italian households. Even the study of Guiso et al. (1996) is limited, because they do not have panel data set. In contrast to the abovementioned study, the focus of this paper is the income (risk) expectation and its impact on savings using panel data. The expectation about the future income and the variation in the expectation over time are the

most important factors for the saving decision. This relation can only be studied by using panel data in which we can observe households over time.

Using a panel data set we examine the impact of income and unemployment expectation on the saving behavior of German households [SAVE]. We are unable to identify a clear influence of a higher income expectation on savings. We only find weak evidence for a negative effect of a higher unemployment expectation on savings. Moreover, we find a positive effect of health expectation on savings in Western Germany but a negative effect in Eastern Germany. The remainder of this paper is organized as follows. In the subsequent section 2 we will give a brief introduction of the theoretical literature on household saving decisions. Section 3 describes the data set and section 4 the estimation strategy. The empirical evidence is presented in section 5. In section 6 we summarize the results and discuss the findings.

2 Theoretical Discussion

This section summarizes the results of Eeckhoudt and Schlesinger (2008). Subsequently, we use these results to formulate a testable hypothesis. Eeckhoudt and Schlesinger (2008) discuss theoretically the impact of different types of risks on savings.¹ The most empirical studies on precautionary savings focus on the variance of income as a proxy for risk. Hence these studies examine the second-degree risk and therefore second-order-stochastic dominance (SSD), meaning the variance of the future income distribution. In the case of SSD a distribution dominates another one because of a lower variance while the mean is equal. Thus the second degree risk is lower. What about the first-degree risk? A small strand of literature [e.g. Engen

¹Their research looms large for the discussion of the impact of (income) expectations because they examine the link of stochastic-dominance and the degree risk. Following Ekern (1980) they define “an increase in N^{th} -degree risk (...) via N^{th} -order stochastic-dominance [Eeckhoudt and Schlesinger (2008) p. 1 330].

and Gruber (2001) or Carroll et al. (2003)] uses the probability of unemployment as a proxy for future income risk. These papers examine the first-degree risk and therefore first-order-stochastic dominance (FSD), or in other words differences in the mean of the future income distribution. If the mean of an income distribution is higher compared an alternative distribution, the first order risk of this distribution is lower. To our knowledge all former studies use proxies for the future income risk, regardless of whether they examine the first- or the second-degree risk. We will use the household's income expectation to examine the impact of first degree risk (expectations) on savings. We do so because a risk-averse consumer always saves more money when he expects a decreasing mean of the future labor income (FSD), e.g. because of a higher probability of unemployment [Eeckhoudt and Schlesinger (2008)]. Thus we formulate the following income expectation hypothesis:

Income Expectation Hypothesis (IEH)

If a distribution of future income (\tilde{y}) first-order stochastic dominates another distribution of future income (\tilde{x}), the optimal level of saving under \tilde{x} is always at least as high as under \tilde{y} . In other words, a lower future (mean) income expectation should increase the saving.

This theoretical proposition will be examined empirically in the following using the German SAVE data set. Since the health of an individual may also affect saving behavior, we also consider the impact of the health expectation on savings.. There is only a very small strand of literature [e.g. Hurd (1989)] which considers the effect of mortality on precautionary savings [see Engen and Gruber (2001)]. Moreover, the effect of the health expectation on saving behavior has not been studied until now. Before we present our estimation strategy and results, the next section describes the SAVE data set.

3 Data set

This section briefly presents the German SAVE data set compiled by the Munich Center for the Economics of Aging (MEA). It is a survey panel about the saving behavior of German households. The annual survey began in 2005. The period from 2005 to 2009 will be used for our empirical analysis. One of the main features of the SAVE panel is the possibility to observe the dynamics of the saving behavior of German households. The sample size differs between 2 222 households in the year 2009 and 3 474 in 2006. 1 351 household are observed continuously between 2005 and 2009. The SAVE data set is designed to be representative of the German population [see Börsch-Supan et al. (2009)].

The survey contains the detailed information, necessary to examine the hypothesis of the model by Eeckhoudt and Schlesinger (2008). Beside general socio-economic information, such as number of persons in the household, age, family status, sex, children, skill level or employment status, the data set also contains detailed information about the saving behavior, the financial situation and the expectations of the household members. The information about the saving behavior is very detailed. Beside the savings and the financial wealth (in euro) the data set also contains information about the reason of saving (e.g. to accumulate deposits to consume or old-age-provision). Among other things the SAVE panel contains financial household data about the labor income (and its distribution between the household members), credits, heritages, financial gains (e.g. lottery), real estate wealth and tax refunds, which may also affect the saving behavior. We additionally calculate the net savings (savings minus debts). Furthermore we can distinguish different types of investment respectively savings (short-, medium- and long-term). Short-term savings are in e.g. savings account. Stocks and shares are types of medium-term savings whereas life insurance or building loan contract are

long-term savings.² Table 1 presents the summary statistics of the households in the data set for the period 2005-2009.

Table 1: Summary statistics of the households [SAVE data set (2005-2009)]

	Western Germany	Eastern Germany
Total Households	2 932	1 009
Medium Quantity of Children*	2.21	2.26
Real Estate Owner	60.75%	43.01%
Low Skilled (Respondent)	14.22%	7.92%
Medium Skilled (Respondent)	63.13%	66.40%
High Skilled (Respondent)	19.51%	23.98%
Medium Household Net-Income	2 477.88	1 875.68
Medium Annual Savings	6 960.38	3 093.58

Source: Author's calculations. * If the household has at least one child.

One of the most important features of the SAVE panel is that it contains variables on the household's (risk) expectations. It contains income and employment as well as the health risk expectations (indirectly). Moreover the current situation of the household members is also captured. To our knowledge only the SAVE panel provides this information (in a panel data set).

For example the "households" are asked to judge the likelihood of an increase in their income in the next year (...) as well as the probability of becoming unemployed [see Börsch-Supan et al. (2009) p. 21]. Furthermore the data set contains valuations of the current health and economic situation. The range of the resulting variables (expectations and situation) is between zero and ten (respectively zero and 100, in ten point steps). Zero means that the household member has a bad expectation respectively he is in a bad situation. A ten represents a very good situation respectively expectation. The interpretation for the unemployment expectation is the converse. If a respondent expects to be unemployed for sure the variable takes on the value ten. In the case becoming unemployed is impossible the variable is one.

² The term is related to the temporal horizon of the investment, meaning how long it takes to divest the capital.

The future health expectation is calculated indirectly. The households were asked if they expect to live longer (3), equal (2) or shorter (1) than comparable persons of their cohort. If a person chose “longer” we can assume that this person has a better health expectation than others. We thus create a dummy variable which is one if the member of the household expects a good future health situation (3) and zero if not (when the answers given are either 1 or 2).

All information is household based. Thus we calculate household expectation and situation variables from the data on the household members. In the cases of unemployment and income expectation the individual share of the household expectations is equal to the income share of each member of the household. We do so because the impact of the individual expectation/situation on the household savings decision should be more important if the member of the household has a bigger share of the household income. For the health expectation we calculate a household dummy variable similar to the health expectation of the household members. This dummy variable becomes one if the household’s overall expectation is larger than two. Thereby we also weighted the individual health expectation of the members of the household by income.

4 Empirical Strategy

This section presents the empirical estimation strategy. The theory presented by Eeckhoudt and Schlesinger (2008) predicts a negative impact of an increasing labor income expectation on savings. We develop a regression model based on the income expectation hypothesis (*IEH*) from the model by Eeckhoudt and Schlesinger (2008). As shown in section 2 the income

expectation should have an impact on the saving behavior of households. The following equation represents our panel regression model³:

$$k_{it(j)} = \beta_0 + \beta_1 s_{yit} + \text{interaction} + \text{controls} + u_{it} (+a_i). \quad (1)$$

A household (subscript(i)) has a savings rate⁴ (k) in period t which is explained by a constant (β_0), the income (*or* unemployment) expectation (s_y) and a set of control and interaction variables as well as an error term.⁵ For each household we calculate household-expectation variables.⁶ Thereby the weight of each householder depends on her/his share on the household's net income. The control variables are: the future health expectation; the current health situation; the net income of each householder; heritages, winnings etc. (income share); a dummy variable for real estate ownership; age and age squared; the number of children, skill level, a bad health expectation variable⁷ and year dummy variables.

We add several interaction terms, because it is possible that the health situation as well as the health expectation of the householders affect the impact of the income expectation on savings. For example, if an individual has a good health expectation for the future he may reduce his savings because he expects a lower income risk. The same is true for the health situation. A person in poor health may save less money even if he has a bad income expectation (higher first-degree risk). Unfortunately the formulation of a hypothesis about the health expectation is not straightforward, because opposing effects are possible and to our knowledge there is no

³ The results from a pooled regression estimation are similar to the results obtained using panel regression methods

⁴ The saving rate is calculated as the share of the household's savings on the net income per year. Furthermore using the savings rate eases the interpretation of the estimation results.

⁵ We also run fixed effect estimations. In this case the savings rate is explained by an additional fixed effect term (a_i).

⁶ The panel includes the individual expectations of the householders but only the overall savings of the household. The individual expectation may affect the individual savings. Because of the household saving information we calculate income weighted household expectations. The individual share on the household's expectations is equal to the individual income share on the overall household income.

⁷ The dummy variable for a bad health expectation is calculated analogously to the good health expectation dummy. The coefficient of this variable becomes insignificant in the great majority of specifications (44 of 48) but the sign confirms mostly the good health expectation dummy variable.

matching theory.⁸ Moreover there is only a very small strand of literature on the effect of health expectations on savings in micro-based data.⁹ Hence we will present the empirical results and provide an approach for future research.

Finally it is also possible, that the income expectations affect savings with different investment periods differently. For example building loan contract may do not reduced because (short-term) income reduction (e.g. unemployment), whereas savings account may decrease. Hence we estimate equation (1) for short, medium and long term savings (see section 3, investment horizon j).

Mutual causality may pose a problem in our regressions since the savings affect the future income expectation. Because of that we also use the expectation about the future employment situation, more precisely the expected probability of becoming unemployed, as an exogenous alternative for the income expectation. We do so because the information about the household's future income expectation in the data set does not differentiate between labour and capital income. Higher savings may increase the future capital income and therefore the income expectation. Thus econometric endogeneity cannot be excluded for sure. To avoid the problem of mutual causality we use also the unemployment expectation to ensure our results. We do so because a higher probability of unemployment is equivalent to a decreasing income expectation [Engen and Gruber (2001)]. Furthermore the saving should not have an impact in the probability and expectation of becoming unemployed. As a result using the employment expectation will not induce a mutual causality and we should focus on the results using the employment expectation.

⁸ The findings of recent studies indicate that wealth may be associated with better self-rated health [Pollack et al. (2007)]. Thus we can assume that a better health expectation is equivalent to a better wealth expectation. Still no clear hypothesis about the impact of health expectation on wealth can be formulated.

⁹ For example Zhang and Zhang (2005) examine the effect of life expectancy on savings by using cross sectional macroeconomic data.. They can show that a higher life expectancy induces higher savings.

We estimate the empirical model with focus on the future employment *and* income expectation of the households for Eastern and Western Germany separately. The households and especially, the income structures differ between both parts of Germany. The female labour market participation and therefore, their share of the household's net income, is much higher in Eastern Germany [Matysiak and Steinmetz (2008)]. Therefore it may also be that the household's saving decision and its impacts differ.¹⁰

We also estimate different specifications of equation (1) to avoid several problems of panel regression estimations. First, we run a Hausman-test to determine whether to use random effect (RE) or fixed effect (FE) estimations. The results suggests RE estimations for the majority of specifications. Nevertheless we will present both, RE and FE, regression results in the following. The use of robust estimators helps avoid heteroscedasticity. Furthermore we check for autocorrelation in the error terms. For the majority of specifications the Wooldridge-test shows no significant autocorrelation in the panel data.¹¹

A second problem is the possibility of collinearity between the exogenous variables, especially between the different expectation and situation variables. An increasing unemployment risk may induce discomfort and therefore a decreasing health expectation. Causality in the other direction is also possible. If individuals expect a bad health situation in the future they may also expect an increasing probability of losing their job/earn less money.¹² Because of this correlation problem we estimate equation (1) separately for the income expectation variable.¹³

¹⁰ Regression for Germany with a dummy variable for Eastern Germany show significant differences (the dummy variable is mainly negative and significant).

¹¹ In critical specifications (Wooldridge-test < 0.05) models with an autocorrelated error term were used. These estimation methods confirm the results of the RE and FE specifications.

¹² The pair wise correlation of these variables is between 0.4 and 0.7 and significant.

¹³ The results of this specification mainly confirm the former specification but more variables become insignificant and the explanatory power of the estimation decreases, because a lot of information is (many variables are) not considered.

The last specification of equation (2) is related to the endogenous variable: the savings.¹⁴ We use two different methods to calculate the annual savings of the households. The first one uses the quantity of savings of each household. The households report their *estimated* sum of savings in the relevant period. The advantage of this method is that only real savings are taken into account, meaning that capital income is excluded. Unfortunately this method does not include dis-saving and debt. Furthermore the households only estimate the sum of their savings and the different kinds of investments are not accounted for separately (see section 2: short, medium and long term savings). The second option is to calculate the change of assets between two periods. The advantage is that this method includes dis-saving and we can consider debt (net saving). The disadvantage is the fact that we cannot differentiate between real savings and capital wins (of investments).¹⁵ In the following we present the results of both estimation strategies with respect to the different definitions of savings in separate specifications for Eastern and Western Germany.

5 Empirical Results

In this section, we examine if we can find evidence for the *IEH* from the model by Eeckhoudt and Schlesinger (2008). Does an increasing labor income expectation (decreasing unemployment expectations) lead to increasing savings? At first we present the RE and FE results for the reported (estimated) real savings of the households in Eastern and Western Germany. As mentioned above dis-saving and debt are excluded in this set-up and the value is only an estimation of the householders. We can divide the savings into *all savings* and *savings*

¹⁴ Furthermore we do a GMM estimation [see Blundell and Bond (2000)], because it is possible that the savings of the last period affect the current savings. For the great majority of specifications (14 of 16) the savings of the last period do not have a significant impact on the current savings. Only in some cases of short savings we find a small impact.

¹⁵ A mixed procedure (e.g. subtraction of the real savings from the change of savings between two periods) cannot solve these problems. The problems of dis-saving and the estimated and reported data remain.

for future income (life insurance and building loan contract = long term savings).¹⁶ Table 2 summarizes the estimation results for Western Germany. Table 3 presents the equivalent results for Eastern Germany.

¹⁶ Unfortunately the separation of the real savings is not that detailed as all reported assets of the household (short, medium, long), but the important long savings are the same.

Table 2: Regression Results for the estimated real savings (Western Germany)

robust	All Savings				Savings for Future Income			
	FE	RE	FE	RE	FE	RE	FE	RE
Households income expectation (IE)	-0.0192 (-1.21)	0.0038 (0.35)			-0.0082 (-1.13)	-0.0018 (-0.36)		
Interaction: income and health good expectation (IGE)	0.0192 (1.21)	-0.0036 (-0.34)			0.0082 (1.12)	0.0019 (0.38)		
Households unemployment expectation (UE)			-0.0090 (-1.03)	0.0051 (0.81)			-0.0047 (-0.84)	-0.0003 (-0.12)
Interaction: unemployment and health good expectation (UGE)			0.0092 (1.04)	-0.0051 (-0.80)			0.0049 (0.87)	0.0004 (0.14)
Households health expectation Good (HEG)	0.0211 (0.14)	0.0485 (0.50)	0.0222 (0.24)	0.1007 (1.50)	0.0555 (0.70)	-0.0014 (-0.28)	-0.0424 (-0.99)	0.0195 (0.72)
Households health situation (HS)	-0.0084 (-0.49)	-0.0081 (-0.74)	-0.0121 (-1.15)	-0.0083 (-0.97)	0.0006 (0.08)	-0.0476 (-1.14)	-0.0082* (-1.66)	-0.0053 (-1.55)
Interaction: health situation and good expectation (HSG)	0.0082 (0.48)	0.0081 (0.73)	0.0122 (1.16)	0.0081 (0.96)	-0.0008 (-0.10)	0.0013 (0.27)	0.0083* (1.68)	0.0052 (1.54)
Hausman-test		0.56		0.07		0.11		0.01
Wooldridge-test		0.68		0.84		0.30		0.78
R ² -within	0.5344	0.5336	0.2475	0.2434	0.5436	0.5432	0.1680	0.1648
R ² -between	0.2592	0.3251	0.0323	0.1969	0.2071	0.2301	0.0648	0.1575
R ² -overall	0.4851	0.5184	0.1308	0.2609	0.4997	0.5092	0.1328	0.1904
Observations	8169		3742		9776		5349	
Controls	net income (per head); heritages, wins etc. (income share); real estate ownership; age and age square (interviewee); children; skill level (interviewee); bad health expectation dummy (interaction-terms) year dummy variable							

Source: authors' calculations. Significance-level: 0.01(***), 0.05(**) and 0.1(*). T-values are reported in parentheses below the coefficients.

Table 3: Regression Results for the estimated real savings (Eastern Germany)

robust	All Savings				Savings for Future Income			
	FE	RE	FE	RE	FE	RE	FE	RE
Households income expectation (IE)	0.0023 (0.47)	0.0065 (0.90)			-0.0019 (-1.01)	-0.0016 (-1.33)		
Interaction: income and health good expectation (IGE)	-0.0026 (-0.54)	-0.0067 (-0.92)			0.0016 (0.89)	0.0015 (1.25)		
Households unemployment expectation (UE)			-0.0112** (-2.36)	-0.0026 (-0.90)			0.0000 (0.03)	-0.0002 (-0.17)
Interaction: unemployment and health good expectation (UGE)			0.0111** (2.35)	0.0026 (0.89)			-0.0000 (-0.06)	0.0002 (0.17)
Households health expectation Good (HEG)	-0.0943 (-0.99)	-0.0265 (-0.57)	0.0190 (0.28)	0.0566 (1.40)	-0.0539*** (-2.96)	-0.0283* (-1.92)	-0.0870** (-2.49)	-0.0021 (-0.11)
Households health situation (HS)	-0.0028 (-0.45)	-0.0012 (-0.27)	0.0162 (1.41)	0.0080** (2.31)	-0.0041* (-1.75)	-0.0024 (-1.45)	-0.0089** (-2.48)	-0.0004 (-0.26)
Interaction: health situation and good expectation (HSG)	0.0031 (0.48)	0.0014 (0.32)	-0.0161 (-1.40)	-0.0078** (-2.29)	0.0042* (1.83)	0.0025 (1.51)	0.0090** (2.52)	0.0004 (0.30)
Hausman-test		0.00		0.01		0.22		0.00
Wooldridge-test		0.40		0.56		0.28		0.58
R ² -within	0.1136		0.3523	0.3337	0.0300	0.0264	0.1495	0.1344
R ² -between	0.4147		0.8004	0.8459	0.0094	0.0374	0.0091	0.0280
R ² -overall	0.1533		0.5462	0.5834	0.0143	0.0314	0.0271	0.0749
Observations		3052		1257		3731		1936
Controls	net income (per head); heritages, wins etc. (income share); real estate ownership; age and age square (interviewee); children; skill level (interviewee); bad health expectation dummy (interaction-terms) year dummy variable							

Source: authors' calculations. Significance-level: 0.01(***), 0.05(**) and 0.1(*). T-values are reported in parentheses below the coefficients.

The results of Table 2 and Table 3 do not confirm the hypothesis of the model, according to which people with a decreasing income expectation should save more money. For Western Germany we are unable to find significant results for the theoretical propositions when using the estimated real savings reported by the household. The Hausman-test indicates that we should focus on the FE estimations for the majority of specifications. Furthermore the Wooldridge-test rejects autocorrelation in all cases.¹⁷ Only one result for Western Germany becomes significant.¹⁸ The households seem to save less money for life insurance and building loan contracts (their savings rate decrease) if they feel to have a good health (health situation).

For Eastern Germany the results are different. Here we find more significant results. Nevertheless the majority of coefficients remain insignificant. For 3 of 4 specifications the Hausman-test rejects the usage of RE estimations. In addition to some of the health variables (expectation and situation) one coefficient for the unemployment expectation in Eastern Germany becomes significant. However the coefficient for the unemployment expectation becomes negative, which cannot be explained by the common models.¹⁹ The coefficients suggest that the households reduce their savings if they expect unemployment. The effect is boosted by a good health expectation.

Moreover we find that the households save less for life assurance and building loan contracts if they have a good future health expectation. Furthermore a good health situation decreases the savings and increases the effect of the health expectations on savings (interaction term).

¹⁷ The Value of the test statistic for the Wooldridge-test should be at least 0.05. The same is true for the Hausman-test.

¹⁸ Some interaction terms become also significant, but an interpretation without significant impacts of the basic variables is not usefully.

¹⁹ The presented framework cannot explain the sign of this coefficient. A possible explanation is given by the German labor market legislation. Before a person can use the long term unemployment benefit he has to reduce their savings down to a fix level. Thus people may adapt their behavior to this fact and dis-save in anticipation of unemployment. This problem may be larger in Eastern Germany because of the higher unemployment rate. Studies by Enger and Gruber (2001) and Hubbard et al. (1994) support this hypothesis. They show that people adjust their savings in presents of social security systems.

The result can be interpreted as follows: If a household expects a better average future health, the current good health boosts the effect of the health expectation. With a better current situation the impact of a good health expectation increases.

In general the R^2 of the regressions and therefore their quality is relatively high. Nevertheless the results should be interpreted with caution. The reported values of the real savings are estimations by the householders (interviewee) and do not include dis-saving and debt. To draw a more detailed picture we will now present results for alternative specifications, more precisely the results for the absolute changes in assets/savings between two periods. These values are based on financial data of the households (not estimated by the householders). Furthermore the assets (savings) can be divided into short, medium and long term. Unfortunately this method also includes capital income (and losses), however dis-saving is also observed. In general this specification should lead to more valuable results. Table 4 (Table 5) summarizes the regression results for Western Germany (Eastern Germany).²⁰

²⁰ The skill level is excluded, because it was insignificant in every specification.

Table 4: Regression Results for change in assets = savings (Western Germany)

robust	All Savings				Short Savings			
	FE	RE	FE	RE	FE	RE	FE	RE
Households income expectation (IE)	-0.1107*	-0.1105*			-0.0378	-0.0066		
	(-1.67)	(-1.78)			(-1.05)	(-0.32)		
Interaction: income and health good expectation (IGE)	0.1108*	0.1111*			0.0374	0.0071		
	(1.68)	(1.78)			(1.04)	(0.34)		
Households unemployment expectation (UE)			-0.0855*	-0.0196			-0.0450**	-0.0312***
			(-1.74)	(-0.64)			(-2.25)	(-2.69)
Interaction: unemployment and health good expectation (UGE)			0.0848*	0.0192			0.0451**	0.0311***
			(1.73)	(0.63)			(2.24)	(2.70)
Households health expectation Good (HEG)	-0.0099	-0.2166	1.3542**	0.3194	0.1579	0.1286	0.2682	0.1024
	(-0.01)	(-0.39)	(2.00)	(0.67)	(0.83)	(1.03)	(1.03)	(0.92)
Households health situation (HS)	-0.0250	0.0215	0.1174	0.0319	0.0128	0.0069	0.0391	0.0235
	(-0.20)	(0.52)	(1.29)	(0.52)	(0.43)	(0.56)	(1.07)	(1.38)
Interaction: health situation and good expectation (HSG)	0.0224	-0.0224	-0.1193	-0.0325	-0.0132	-0.0072	-0.0389	0.0236
	(0.18)	(-0.54)	(-1.31)	(-0.53)	(-0.44)	(-0.58)	(-1.06)	(-1.38)
Hausman-test		0.77		0.64		0.01		0.77
Wooldridge-test		0.37		0.98		0.00		0.21
R ² -within	0.0508	0.0493	0.0070	0.0030	0.0879	0.0831	0.0123	0.0065
R ² -between	0.0178	0.0527	0.0000	0.0081	0.0162	0.0578	0.0000	0.0101
R ² -overall	0.0366	0.0536	0.0001	0.0049	0.0564	0.0818	0.0011	0.0083
Observations		6859		3128		6859		3128
Controls	net income (per head); heritages, wins etc. (income share); real estate ownership; age and age square (interviewee); children; skill level (interviewee); bad health expectation dummy (interaction-terms) year dummy variable							

robust	Medium Savings				Long Savings			
	FE	RE	FE	RE	FE	RE	FE	RE
Households income expectation (IE)	-0.0170 (-1.55)	-0.0081 (-1.07)			-0.0139 (-0.46)	-0.0781 (-1.43)		
Interaction: income and health good expectation (IGE)	0.0175 (1.60)	0.0084 (1.11)			0.0141 (0.47)	0.0782 (1.42)		
Households unemployment expectation (UE)			-0.0218 (-1.44)	0.0014 (0.15)			-0.0017 (-0.04)	0.0234 (0.75)
Interaction: unemployment and health good expectation (UGE)			0.0220 (1.45)	-0.0014 (-0.14)			0.0011 (0.03)	-0.0237 (-0.76)
Households health expectation Good (HEG)	0.3823* (1.92)	0.1736* (1.88)	0.2686 (0.81)	-0.1013 (-0.89)	0.0041 (0.01)	-0.2523 (-0.45)	1.3577* (1.70)	0.4887 (1.10)
Households health situation (HS)	0.0702** (2.03)	0.0274* (1.90)	0.0321 (0.67)	-0.0074 (-0.46)	-0.0180 (-0.14)	0.0192 (0.51)	0.1798* 1.59	0.0550 (0.95)
Interaction: health situation and good expectation (HSG)	-0.0707** (-2.05)	-0.0276* (-1.91)	-0.0325 (-0.66)	0.0075 (0.46)	0.0165 (0.13)	-0.0197 (-0.52)	-0.1806 (-1.57)	-0.0553 (-0.95)
Hausman-test		0.61		0.13		0.86		0.68
Wooldridge-test		0.58		0.12		0.10		0.64
R ² -within	0.0054	0.0035	0.0118	0.0046	0.0218	0.0206	0.0068	0.0027
R ² -between	0.0003	0.0055	0.0005	0.0199	0.0066	0.0205	0.0000	0.0097
R ² -overall	0.0001	0.0031	0.0006	0.0058	0.0134	0.0223	0.0003	0.0046
Observations		6859		3128		6859		3128
Controls	net income (per head); heritages, wins etc. (income share); real estate ownership; age and age square (interviewee); children; skill level (interviewee); bad health expectation dummy (interaction-terms) year dummy variable							

Source: authors' calculations. Significance-level: 0.01(***), 0.05(**) and 0.1(*). T-values are reported in parentheses below the coefficients.

In contrast to the former setting (reported, estimated savings), these regression results (change in assets) partly seem to confirm *IEH*. Furthermore, in Western Germany we find a much more significant impact of the expectation variables in the different settings. A possible explanation for these results may be the consideration of dis-savings and debts. Except for one setting (short term savings and income expectation) the Hausman-test suggests to use the RE estimations. Furthermore autocorrelation can be excluded (except in the same setting as above) by the Wooldridge-test.

The results for the income and unemployment expectation are ambiguous for Western Germany (see Table 4). The estimation with the income expectation confirms the *IEH*. We find evidence that an increasing income expectation decreases the savings (saving rate). If the household expects a higher income (one step on a scale up to ten) the saving rate decrease about 0.11 percentage points (pp), especially for short term savings.²¹ These results confirm the hypothesis that a lower future income expectation should always increase the savings.

However, Western German households decrease their overall saving rate about 0.08 pp if they expect a higher probability of becoming unemployed (also equal to a lower income expectation). This reduction is driven by a decrease of the short term savings (-0.03 to 0.04 pp). Two possible reasons may explain these different results. First, the usage of the income expectation may induce mutual causality (see section 4). Second, the German labor market legislation may affect the saving decision. If a person becomes unemployed only long term savings (e.g. life assurance or building loan contract) are secured. An unemployed person does not have to liquidate these kinds of savings before he can request unemployment benefits. In contrast he has to consume his short term savings. Thus the negative effect may result from the German labor market legislation. If householders expect unemployment, they

²¹ A good health expectation increases this effect (interaction term is significant and positive). This seems to be plausible, because households with a good health expectation may compensate a higher income risk in late working periods.

may dis-save their short term savings.²² The estimation does not confirm the *IEH* for Western Germany.

Now we take an additional look on the health expectation respectively the health situation in Western Germany. We find that a good health expectation increases the saving rate significantly between 0.17 and 1.35 pp. Moreover good current health reduces the positive effect of a good health expectation on savings. If the household's health expectation is good (beyond the average lifetime expectation) the saving rate is between 0.38 and 1.35 pp higher than for other households. This seems to be true for medium and long term savings.

Especially for medium savings a good current health situation of the household increases the savings, too. But this effect is much smaller. A better health situation (one step in a scale of 1 to 10) increases the saving rate for medium savings for about 0.02 to 0.07 pp. Hence the effect of the health expectation seems to be much more important.

²² This result supports the findings of Engen and Gruber (2001) and Hubbard et al. (1994) by using the expected unemployment probability of households in contrast to use proxies for the probability of unemployment.

Table 5: Regression Results for change in assets = savings (Eastern Germany)

robust	All Savings				Short Savings			
	FE	RE	FE	RE	FE	RE	FE	RE
Households income expectation (IE)	0.1321 (1.49)	0.0939 (1.45)			0.0586** (1.98)	0.0352* (1.78)		
Interaction: income and health good expectation (IGE)	-0.1328 (-1.49)	-0.0942 (-1.45)			-0.0586** (-1.97)	-0.0352* (-1.78)		
Households unemployment expectation (UE)			0.2205 (0.96)	0.0627 (0.58)			0.0932 (1.18)	0.0378 (1.10)
Interaction: unemployment and health good expectation (UGE)			-0.2210 (-0.96)	-0.0629 (-0.58)			-0.0928 (1.19)	-0.0377 (-1.09)
Households health expectation Good (HEG)	-1.8433** (-1.99)	-0.8385** (-2.04)	-3.8404* (-1.89)	-2.1880** (-2.41)	-0.4273* (-1.74)	-0.1826 (-1.53)	-0.6974 (-1.15)	-0.3603 (-1.51)
Households health situation (HS)	-0.2214 (-1.54)	-0.1159 (-1.46)	-0.5550* (-1.66)	-0.3250** (-2.20)	-0.0654* (-1.65)	-0.0300 (-1.47)	-0.1378 (-1.26)	-0.0699 (-1.55)
Interaction: health situation and good expectation (HSG)	0.2220 (1.43)	0.1161 (1.46)	0.5558* (1.67)	0.3253** (2.21)	0.0654* (1.65)	0.0300 (1.47)	0.1379 (1.26)	0.0698 (1.54)
Hausman-test		0.64		0.09		0.51		0.04
Wooldridge-test		0.21		0.15		0.23		0.14
R ² -within	0.0133	0.0094	0.0440	0.0329	0.0150	0.0123	0.0574	0.0498
R ² -between	0.0001	0.0061	0.0000	0.0285	0.0000	0.0065	0.0292	0.0362
R ² -overall	0.0019	0.0080	0.0128	0.0278	0.0044	0.0089	0.0225	0.0337
Observations		2726		1109		2726		1109
Controls	net income (per head); heritages, wins etc. (income share); real estate ownership; age and age square (interviewee); children; skill level (interviewee); bad health expectation dummy (interaction-terms) year dummy variable							

robust	Medium Savings				Long Savings			
	FE	RE	FE	RE	FE	RE	FE	RE
Households income expectation (IE)	-0.0350 (-1.29)	-0.0234 (-1.45)			0.0493 (0.75)	0.0386 (0.76)		
Interaction: income and health good expectation (IGE)	0.0352 (1.28)	0.0235 (1.46)			-0.0495 (-0.76)	-0.0389 (-0.77)		
Households unemployment expectation (UE)			-0.0267 (-0.65)	0.0024 (0.12)			-0.0132 (0.17)	-0.0406 (-0.66)
Interaction: unemployment and health good expectation (UGE)			0.0266 (0.66)	-0.0025 (-0.12)			0.0124 (0.16)	0.0403 (0.65)
Households health expectation Good (HEG)	0.2863 (1.30)	0.1867* (1.65)	0.2939 (0.94)	0.1846 (1.31)	-1.1174* (-1.72)	-0.5443* (-1.85)	-1.7560 (-1.52)	-1.3915** (-2.06)
Households health situation (HS)	0.0433 (1.19)	0.0334 (1.56)	0.0046 (0.07)	0.0042 (0.15)	-0.1239 (-1.04)	-0.0695 (-1.10)	-0.1902 (-1.43)	-0.1672* (-1.95)
Interaction: health situation and good expectation (HSG)	-0.0432 (-1.19)	-0.0333 (-1.56)	-0.0049 (-0.07)	-0.0045 (-0.15)	0.1240 (1.05)	0.0696 (1.10)	0.1910 (1.44)	0.1675** (1.95)
Hausman-test		0.38		0.39		0.48		0.99
Wooldridge-test		0.01		0.01		0.18		0.37
R ² -within	0.0111	0.0056	0.0351	0.0230	0.0131	0.0098	0.0120	0.0085
R ² -between	0.0006	0.0359	0.0041	0.0201	0.0000	0.0076	0.0030	0.0388
R ² -overall	0.0028	0.0143	0.0030	0.0180	0.0012	0.0085	0.0017	0.0147
Observations		2726		1109		2726		1109
Controls	net income (per head); heritages, wins etc. (income share); real estate ownership; age and age square (interviewee); children; skill level (interviewee); bad health expectation dummy (interaction-terms) year dummy variable							

Source: authors' calculations. Significance-level: 0.01(***), 0.05(**) and 0.1(*). T-values are reported in parentheses below the coefficients.

The results for Eastern Germany are different compared to Western Germany (see Table 5). For all specifications (with significant coefficients) we can use RE estimations. In contrast to the *IEH* the income expectation shows a positive and significant impact on the short-term savings. The households increase their saving rate about 0.04 pp if they expect a higher income (one step on a scale of 1 to 10). Of course mutual causality is also a problem and the result of Table 3 shows a significant negative impact of an increasing unemployment probability (lower income expectation) on the saving rate in Eastern Germany. The household decreases its savings if unemployment is expected (=lower income expectation). Like in Western Germany the German labor market legislation may induce that coefficient. Thus we cannot confirm the *IEH*, because neither the result for the unemployment nor for the income expectation supports the hypothesis in any setting (Table 3 and Table 5).

With respect to the health expectation and situation we find a significant negative impact of a good health expectation on the savings rate in several settings for Eastern Germany.²³ Thus an increasing health expectation decreases the saving rate. In contrast to Western Germany, Eastern German households with a good health expectation have a 0.83 to 2.18 pp lower saving rate than households with an average health expectation. For some cases (*short-term savings* and *all savings*) a better current health situation decreases the saving rate and boosts the negative effect of good health expectation (interaction).

If we compare the results of Table 2 and Table 4 (respectively Table 3 and Table 5) we see that regressions of the first approach (Table 2 and Table 3) have a much higher explanatory power (R^2) but less significant coefficients. The critical interpretation of both settings leads to the following result: the impact of the labor income, respectively the unemployment, expectation on savings in Western Germany differs in both settings. We find no significance of these variables in the first setting (Table 2) but in the second one (Table 4), whereas the

²³ Only in one case the coefficient is positive and significant. But the result of this regression should be interpreted with caution because of possible autocorrelation (Wooldridge-test).

results of the second setting cannot confirm the *IEH*. In Eastern Germany both settings do not confirm the *IEH* from the Eeckhoudt and Schlesinger (2008) framework. The health expectation has different impacts in Eastern and Western Germany. The impact of the health expectation is supported by both settings in Eastern Germany. In contrast to Western Germany we find negative signs.

6 Conclusions

This paper analyzes the impact of expectations on the saving behavior of households. In contrast to former studies we use panel data of German households which contains information about the individual income expectations as well as detailed information about the savings. We develop an income expectation hypothesis based on the model by Eeckhoudt and Schlesinger (2008), whereupon a lower future (mean) income expectation should always increase the households' savings. By examining the impact of individual income and unemployment expectation (first-degree risk) on savings we find evidence for Western Germany that a lower income expectation increases the overall saving rate. This result cannot be confirmed by using the unemployment expectation, which would be necessary to exclude mutual causality.²⁴ If we use the unemployment expectation we find that an increasing unemployment expectation, which is equivalent to a lower income expectation, decreases saving. This result holds for Eastern and Western Germany and cannot be explained by the theoretical model. In contrast to previous studies we are unable to confirm the precautionary saving hypothesis using individual income expectations data.

²⁴ Because of a possible and plausible mutual causality, we use the future unemployment expectations of the householders beside the future income expectation. We do so because the current saving behavior may affect the future income expectations (vice versa). In contrast, the current saving behavior does not affect the probability of becoming unemployed. Therefore we avoid mutual causality.

The German labor market legislation is a possible reason for this observation.²⁵ The unemployed have to liquidate medium and short-term savings before they can apply for unemployment benefits. Hence our result supports the findings of Engen and Gruber (2001) as well as Hubbard et al. (1994). Both papers find a negative impact of social security systems on savings. In contrast to them these studies we use individual expectations about the future income and unemployment probability. Nevertheless our results corroborate theirs.

We measure the savings with two different methods. The first one uses the savings which were estimated by the householder and without accounting for dis-savings and debt. The second method is to calculate the change of assets (including debts, capital income and losses), whereby dis-savings and debts can be observed. Both methods lead to similar results in Eastern and Western Germany. Furthermore our analyses show evidence that a good health expectation of the householder (the lifetime expectation is above the average) increases the saving rate in Western Germany but decreases in Eastern Germany.

Our analysis shows little evidence that the individual income or unemployment expectation affects the savings. Furthermore we find that the individual health expectation as well as the health situation has a significant impact on the saving behavior of German households. Both (risk) expectations can distort the saving decision. Thus exogenous shocks in the labor market (expectations) or the health (expectations) may affect the savings rates and therefore the capital markets and investments. As a consequence social security systems can avoid contagion-effects. For example, if a society prefers flexible labor markets, (relatively) high short-term unemployment benefits (e.g. Denmark) can increase the (labor) income expectation and therefore its impact on savings. The same is true for the health care system, which may reduce uncertainty about the future health.

²⁵ Lusardi (1997) point out, that „the existence of institutions (...) which potentially allow households to insure against income risk (...) should not be overlooked. The mere existence of these institutions can provide evidence per se that it is very important to avoid income risk” [Lusardi (1997) p. 325].

Former studies show that “the introduction of social health insurance can substantially reduce uncertainty about out-of-pocket health expenditures, and thus reduce households’ precautionary-saving motive (...) and increased their consumption when the comprehensive health insurance became available” [Chou et al. (2003) p 1 892]. Nevertheless the availability of a social security system (e.g. private or public health insurance) can also prevent the precautionary saving [e.g. see Engen and Gruber (2001) or Hubbard et al. (1994)] which should not be the aim of social policy.

Future theoretical research may answer the question of how the health expectation affects the saving decision. Moreover it is still unclear if the impact of different degree risks on the savings behavior depends on the social security system. All theoretical and empirical studies (including this one) focus on the effect of first-degree risk on savings with respect to a tax and transfer systems but the impact of higher degree risk is empirically and theoretically unclear.²⁶

²⁶ Arent et al. (2011) discuss the effect of a tax and transfers on the impact of higher degree income risk on savings.

References

Aaron, H. J. (1999), 'Behavioral dimensions of retirement economics', Brookings Institution Press 1999, Washington D.C. (USA).

Arent, S. A. Eck, M. Kloss and O. Krohmer (2011), 'Income Risk, Saving and Taxation: Will Precautionary Saving Survive?', ifo working paper No. 125.

Blundell, R. and S. Bond (2000), 'GMM Estimation with Persistent Panel Data: An Application to Production Functions', *Econometric Reviews* 19 (3), 321-340.

Börsch-Supan, A., M. Coppola, L. Essig, A. Eymann and D. Schunk (2009), 'The German SAVE study - Design and Results', The German SAVE study - Design and Results (MEA), Max-Planck-Institut für Sozialrecht und Sozialpolitik, Munich, Germany.

Browning, M. and A. Lusardi (1996), 'Household saving: Micro theories and micro facts', *Journal of Economic literature* 34, 1797-1855.

Carroll, C., K. Dynan and S. Krane (2003), 'Unemployment Risk and Precautionary Wealth: Evidence from Households' Balance Sheets', *Review of Economics and Statistics* 85 (3), 586-604.

Chou, S. Y., J. T. Lui and J. K. Hammitt (2003), 'National Health Insurance and Precautionary Saving: Evidence from Taiwan', *Journal of Public Economics* 87, 1 873-1 894.

Eeckhoudt, L. and H. Schlesinger (2008), 'Changes in Risk and the Demand for Savings', *Journal of Monetary Economics* 55 (7), 1 329-1 336.

Ekern, S. (1980), 'Increasing Nth Degree Risk', *Economics Letters* 6, 329–333.

Engen, E. M. and J. Gruber (2001), 'Unemployment Insurance and Precautionary Saving', *Journal of Monetary Economics* 47, 545-579.

Guiso, L., T. Jappelli and D. Terlizzese (1996), 'Income Risk, Borrowing Constraints, and Portfolio Choice', *The American Economic Review* 86 (1), 158-172.

Guiso, L., T. Jappelli and D. Terlizzese (2002), 'An Empirical Analysis of Earnings and Employment Risk', *Journal of Business and Economic Statistics*, 20 (2), 241-253.

Hubbard, R. G., J. Skinner and S. P. Zeldes 1994. 'The Importance of Precautionary Motives in Explaining Individual and Aggregate Saving', *Carnegie-Rochester Conference Series on Public Policy* 40 (1), 59-125.

Hurd, M. (1989), 'Mortality Risk and Requests', *Econometrica* 57, 779–814.

Lusardi, A. (1997), 'Precautionary Saving and Subjective Earnings Variance', *Economics Letters* 57, 319-326.

Lusardi, A. (1998), 'On the Importance of the Precautionary Saving Motive', *The American Economic Review* 88 (2), 449-153.

Matysiak, A. and S. Steinmetz (2008), 'Finding Their Way? Female Employment Patterns in West Germany, East Germany, and Poland', *European Sociological Review* 24 (3), 331-345.

Pollack, C. E., S. Chideya, C. Cubbin, B. Williams, M. Dekker and P. Braveman (2007). 'Should Health Studies Measure Wealth? A Systematic Review', *American Journal of Preventive Medicine* 33 (3), 250-264.

Zhang, J. and J. Zhang (2005), 'The Effect of Life Expectancy on Fertility, Saving, Schooling and Economic Growth: Theory and Evidence', *The Scandinavian Journal of Economics* 107 (1), 45–66.

Data

Munich Center for the Economics of Aging (2011), 'Saving and Financial Investment of Private Households (SAVE) 2001-2009', Max-Planck-Institut für Sozialrecht und Sozialpolitik, Munich, Germany.

Ifo Working Papers

- No. 127 Hornung, E., Railroads and Micro-regional Growth in Prussia, March, 2012.
- No. 126 Seiler, C., On the Robustness of the Balance Statistics with respect to Nonresponse, March 2012.
- No. 125 Arent, S., A. Eck, M. Kloss and O. Krohmer, Income Risk, Saving and Taxation: Will Precautionary Saving Survive?, February 2012.
- No. 124 Kluge, J. and R. Lehmann, Marshall or Jacobs? Answers to an Unsuitable Question from an Interaction Model, February 2012.
- No. 123 Strobel, T., ICT Intermediates, Growth and Productivity Spillovers: Evidence from Comparison of Growth Effects in German and US Manufacturing Sectors, February 2012.
- No. 122 Lehwald, S., Has the Euro Changed Business Cycle Synchronization? Evidence from the Core and the Periphery, January 2012.
- No. 121 Piopiunik, M. and M. Schlotter, Identifying the Incidence of “Grading on a Curve”: A Within-Student Across-Subject Approach, January 2012.
- No. 120 Kauppinen, I. and P. Poutvaara, Preferences for Redistribution among Emigrants from a Welfare State, January 2012.
- No. 119 Aichele, R. and G.J. Felbermayr, Estimating the Effects of Kyoto on Bilateral Trade Flows Using Matching Econometrics, December 2011.
- No. 118 Heid, B., J. Langer and M. Larch, Income and Democracy: Evidence from System GMM Estimates, December 2011.
- No. 117 Felbermayr, G.J. and J. Gröschl, Within US Trade and Long Shadow of the American Secession, December 2011.
- No. 116 Felbermayr, G.J. and E. Yalcin, Export Credit Guarantees and Export Performance: An Empirical Analysis for Germany, December 2011.

- No. 115 Heid, B. and M. Larch, Migration, Trade and Unemployment, November 2011.
- No. 114 Hornung, E., Immigration and the Diffusion of Technology: The Huguenot Diaspora in Prussia, November 2011.
- No. 113 Riener, G. and S. Wiederhold, Costs of Control in Groups, November 2011.
- No. 112 Schlotter, M., Age at Preschool Entrance and Noncognitive Skills before School – An Instrumental Variable Approach, November 2011.
- No. 111 Grimme, C., S. Henzel and E. Wieland, Inflation Uncertainty Revisited: Do Different Measures Disagree?, October 2011.
- No. 110 Friedrich, S., Policy Persistence and Rent Extraction, October 2011.
- No. 109 Kipar, S., The Effect of Restrictive Bank Lending on Innovation: Evidence from a Financial Crisis, August 2011.
- No. 108 Felbermayr, G.J., M. Larch and W. Lechthaler, Endogenous Labor Market Institutions in an Open Economy, August 2011.
- No. 107 Piopiunik, M., Intergenerational Transmission of Education and Mediating Channels: Evidence from Compulsory Schooling Reforms in Germany, August 2011.
- No. 106 Schlotter, M., The Effect of Preschool Attendance on Secondary School Track Choice in Germany, July 2011.
- No. 105 Sinn, H.-W. und T. Wollmershäuser, Target-Kredite, Leistungsbilanzsalden und Kapitalverkehr: Der Rettungsschirm der EZB, Juni 2011.
- No. 104 Czernich, N., Broadband Internet and Political Participation: Evidence for Germany, June 2011.
- No. 103 Aichele, R. and G.J. Felbermayr, Kyoto and the Carbon Footprint of Nations, June 2011.
- No. 102 Aichele, R. and G.J. Felbermayr, What a Difference Kyoto Made: Evidence from Instrumental Variables Estimation, June 2011.
- No. 101 Arent, S. and W. Nagl, Unemployment Benefit and Wages: The Impact of the Labor Market Reform in Germany on (Reservation) Wages, June 2011.