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Precautionary and Entrepreneurial Saving

New Evidence from German Households

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Precautionary and Entrepreneurial Saving[a]

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New Evidence from German Households

Frank M. Fossen[b] Davud Rostam-Afschar[c]

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Abstract

The well-documented positive correlation between income risk and wealth was interpreted as evidence for high amounts of precautionary wealth in various studies. However, the large estimates emerged from pooling non-entrepreneurs and entrepreneurs without controlling for heterogeneity. This paper provides evidence for Germany based on representative panel data including private wealth balance sheets. Entrepreneurs, who face high income risk, hold more wealth than employees, but it is shown that this is not due to precautionary motives. Entrepreneurs may rather save for old age, as they are usually not covered by statutory pension insurance. The analysis accounts for endogeneity of entrepreneurial choice.

Keywords: precautionary saving, precautionary wealth, entrepreneurship
JEL: D91, D12, E21

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1. Introduction

Various studies have suggested that a large share of the wealth of households can be explained by a precautionary saving motive. Quantity estimates of precautionary savings are important because of their implications for policies that affect income risk, particularly labor market, social security and taxation policy. If the precautionary saving motive is strong, policies that increase income risk will raise savings, which in turn is likely to influence the growth rate of an economy (e.g. Femminis, 2001).

A widely applied estimation approach is to use the relationship between the income risk of households and their wealth holdings to quantify the fraction of wealth which is held as precaution against systematic uncertainty. If the stock of wealth is positively related to income variations, this is interpreted as evidence for the existence of precautionary saving. Applying this method to panel data from the USA, Kazarosian (1997) found a strong precautionary saving motive, and Carroll and Samwick (1997, 1998) reported that precautionary savings even amount to almost half of American households' wealth. By analyzing data on the subjective assessment of risks, Lusardi (1997, 1998) cast doubt on these high estimates.

Hurst et al. (forthcoming) showed that the precautionary saving motive was overestimated in previous literature that did not properly account for heterogeneity between entrepreneurial and non-entrepreneurial households. Entrepreneurs hold more wealth, face higher income risk and differ in their saving motives from other households. Explicitly taking account of the special role of entrepreneurial households, Hurst et al. (forthcoming) estimated precautionary wealth to represent less than ten percent of overall wealth in the USA. They were also able to show that large estimates of precautionary savings reported by prior studies resulted from pooling together entrepreneurial and non-entrepreneurial households and vanish if the sample is split, or controls for entrepreneurial households are introduced.

This paper adds to this evolving literature by providing the first analysis of the existence and quantity of precautionary savings explicitly accounting for entrepreneurship in Germany. The findings reported by Hurst et al. (forthcoming) for the USA turn out to be even more

important in Germany: Using our preferred specifications, no statistically significant evidence of precautionary saving remains once entrepreneurship is accounted for, and when the dependent variable is total net worth (with or without business wealth), rather than just financial wealth. The analysis is based on the Socio-Economic Panel (SOEP), which has the crucial advantages of providing information on private wealth balance sheets and individual measures of risk aversion.

By focusing on Germany, this study examines the importance of accounting for entrepreneurship when estimating precautionary savings in a country where employees, as opposed to entrepreneurs, are covered by an extensive social security system. In particular, saving behavior may differ between entrepreneurs and non-entrepreneurs even more than in the USA because employees are covered by statutory pension insurance, whereas entrepreneurs have to save for their old age consumption.

Fuchs-Schündeln and Schündeln (2005) and Bartzsch (2008) identified about one fifth of household wealth in Germany as precautionary, using different strategies to control for risk aversion. They employed the same data as in this analysis, the German SOEP. Upon re-examination, their results could represent portfolio decisions in favor of liquid assets rather than precautionary saving, because they find an influence of uncertainty on financial assets only, which represent the most liquid component of a household's wealth portfolio. Essig (2005) and Schunk (2007) used the German SAVE dataset of the Mannheim Research Institute for the Economics of Aging (MEA) to relate saving behavior to motives which are elicited based on subjective importance measures. One of Essig's (2005) findings is a higher savings rate of the self-employed. In line with our reasoning, he doubts this can be attributed to uncertainty.

The main methodological contribution of this paper beyond Hurst et al. (forthcoming) is that entrepreneurial status is recognized and treated as being endogenous with respect to wealth. Endogeneity may arise from credit constraints faced by nascent entrepreneurs, for example, as more wealthy people are more likely to be able to enter entrepreneurship. To deal with this, the wealth equations of entrepreneurs and non-entrepreneurs are modeled as

an endogenous switching regression, among other specifications.

The following section presents the empirical methodology employed to test the hypothesis of precautionary saving. In Section 3, different strategies are suggested how entrepreneurship can be accounted for appropriately. A description of the data follows in Section 4. The main analysis is conducted in two stages. First, we construct measures of permanent income and of income uncertainty, as described in Section 5. Second, we estimate wealth equations. Section 6 presents the results, which are discussed in Section 7, and Section 8 concludes.

2. Empirical Specification

The estimation equation is motivated by the buffer-stock model developed by Deaton (1991) and Carroll (1992, 1997, 2004). The model's main feature is a target wealth-to-income ratio, which describes a positive relation between wealth W and permanent income P that consumers want to maintain. If wealth is above the target, consumption will exceed income and wealth will fall. If wealth is below the target, income will exceed consumption and wealth will rise.[1] According to the model, the size of the wealth target depends on the degree of uncertainty ω a consumer faces.[2] Additionally, target wealth may be shifted by a vector of observed characteristics x and an unobserved error term u:

$$\frac{W}{P} = f(\omega,x,u). \tag{1}$$

As wealth and income are highly unequally distributed, natural logarithms are chosen for the empirical specification:

$$ln(W_{it}) = \alpha_0 + \gamma'\omega_{it} + \alpha_1 ln(P_{it}) + \beta' x_{it} + u_{it} \tag{2}$$

1 This would explain why the saving rate increased in the USA, after wealth balances shrunk during the recent financial turmoil. Since the beginning of 2005 to April 2008 the seasonally adjusted annual personal saving rate as provided by the Bureau of Economic Analysis of the U.S. Department of Commerce remained quite stable at an average of 1.8%. From May 2008 on, when the financial crisis had hit the economy, savers reacted by accumulating 3.9% on average till June 2009, the end of the reporting period.

2 In this general notation ω is written as a vector, because in one specification we decompose income risk into permanent and transitory components (see Section 4).

The equation is estimated at the household level, because household members are likely to take saving decisions jointly based on pooled income. Thus, P denotes permanent household income.[3] We measure W as total net worth, i.e. total assets of the household minus total debt. In contrast to analyzing wealth components, e.g. financial assets, this avoids mixing saving with portfolio decisions. Wealth components will be examined additionally for comparison with the literature. The vector x contains characteristics of the household or household head as control variables. It includes age, age squared, years in unemployment and its square, work experience and its square, and dummy variables indicating gender, marital status, the number of children under 17 in the household, nationality, region, disability, and the year of observation. Additionally, 10 dummy variables representing the self-reported risk attitude on a scale from 0 to 10 are included, similarly to Bartzsch (2008). This controls for self-selection of more risk tolerant people into occupations with higher income risk, which might otherwise lead to a downward selection bias in the coefficient of the income variance. In a field experiment with real money at stake, based on a representative sample of 450 subjects, Dohmen et al. (2005) found that these survey measures of the willingness to take risks are good predictors of actual risk-taking behavior.[4]

The buffer-stock model predicts $\alpha_1 > 0$. With respect to γ, the theoretical proposition is a positive value,[5] as the optimal reaction to greater uncertainty is to hold more wealth. This corresponds to the existence of a precautionary saving motive. The different uncertainty measures used will be described in Section 4. In the following section, the specification is further elaborated on to account for the specific role of entrepreneurship.

3 We assume that households regard uncertainty in terms of variation in net rather than gross income. This is an important distinction, because gross income's variation is reduced by progressive taxation.

4 Since information on risk attitudes are only available in the SOEP waves 2004 and 2006, while the main analysis is based on the years 2002 and 2007 (see Section 4), the attitudes in 2002 are approximated by the observations in 2004 and in 2007 by the observations in 2006.

5 Respectively, positive components of γ, if the decomposed measure of uncertainty is used.

3. Dealing with Entrepreneurs

As mentioned in the introduction, Carroll and Samwick (1997, 1998) presented estimation results for the USA which indicated that almost 50% of total net worth is due to the precautionary motive. They used occupational categories, which included self-employed managers, as instruments for their measures of earnings risk and permanent income. The approach requires the strong assumption that entrepreneurship has no direct influence on wealth. The authors identified the self-employed as crucial for their high estimate of precautionary savings: When they excluded farmers and the self-employed from the sample, their estimations showed almost no support for the existence of precautionary saving. They argued that these two groups provided variation in income and hence these groups should remain in the sample (Carroll and Samwick, 1998, p. 415).

The main critique of this interpretation by Hurst et al. (forthcoming) was that the correlation between wealth and income uncertainty in the pooled sample is not due to a precautionary motive rather than to differences between entrepreneurs and non-entrepreneurs, as entrepreneurs have both higher income variance and more wealth for reasons unrelated to precautionary savings. They argued that other incentives to save for entrepreneurs could explain the higher amounts of wealth, such as saving for old-age provision, as the propensity to have a pension is higher for non-entrepreneurs than for entrepreneurs. Entrepreneurial and non-entrepreneurial households may also differ in preferences. An entrepreneurial household could have a different bequest or housing motive or discount factor.

This leads to heterogeneity between entrepreneurs and non-entrepreneurs that has to be accounted for. There are three potential strategies how to do this:

1. By employing a dummy variable for entrepreneurial households in x.
2. By excluding entrepreneurial households from the sample.
3. By using a measure of wealth W that does not include business equity.

The effect of accounting for entrepreneurship was shown using PSID data for the USA by Hurst et al. (forthcoming). They demonstrated that the estimated amount of precautionary

saving decreases from 50% without accounting for entrepreneurs to less than 10%.

The differences in the savings behavior between entrepreneurs and non-entrepreneurs may be even larger in Germany because of the more important role of the social security system. Employees are covered by statutory pension insurance, whereas entrepreneurs usually are not. Entrepreneurs have to save for their old age consumption, for example by paying into life or private pension insurance, investing in property, or reinvesting in their own business, all of which is part of total net worth, the dependent variable. The coefficient of an entrepreneurship dummy variable captures the additional saving of entrepreneurs that are due to their status and not to their higher income variance. As entrepreneurship is strongly correlated with a higher variance of income, omitting the entrepreneurship dummy in the pooled sample leads to an upward bias of the estimated coefficient of income risk. This leads to an overestimation of precautionary saving in the whole population.

While solving the omitted variable problem, including an entrepreneurship dummy in x may introduce another endogeneity problem. If credit constraints exist for nascent entrepreneurs, wealthier households may be more likely to enter entrepreneurship (e.g. Nykvist, 2008; Hurst and Lusardi, 2004; Johansson, 2000; Blanchflower and Oswald, 1998). Endogeneity potentially biases all estimated coefficients, including the coefficient of income risk and thus the estimated degree of precautionary saving.

We employ the instrumental variables (IV) technique to deal with the endogeneity of the entrepreneurship dummy in the pooled regression. As instruments, dummy variables are used, which indicate a self-employed father[6] of the household head, whether the household head's father and mother had high school diplomas that qualify for university entrance (Abitur), and the highest educational attainment of the household head.[7] Having a self-employed father is well-known to strongly increase the probability of being an entrepreneur (Dunn and Holtz-Eakin, 2000).

6 In Germany, self-employed mothers were rare in the generation of most respondents' parents, and the information are often missing, so only self-employed fathers are used.

7 Four levels are distinguished: apprenticeship, technical school degree or Abitur, higher technical college degree or similar, and university degree.

The GMM IV-estimation based on the pooled sample assumes that the coefficients are the same for entrepreneurs and non-entrepreneurs. Splitting the sample between entrepreneurs and non-entrepreneurs is less restrictive as the coefficients are allowed to differ. Estimation on the sub-sample of non-entrepreneurs then corresponds to the second approach mentioned above, i.e. excluding entrepreneurs from the sample. For the same reasons that cause the endogeneity of the entrepreneurship dummy in the pooled regression, splitting the sample between entrepreneurs and non-entrepreneurs may introduce selectivity bias, as selection into entrepreneurship is non-random.

Instead of simply splitting the sample we thus employ an endogenous switching regression model, where entrepreneurs ($I = 1$) face a different regime than non-entrepreneurs (cf. Maddala, 1983; Lokshin and Sajaia, 2004):

$$I_{it} = 1 \qquad \text{if } \delta z_{it} + v_{it} > 0$$

$$I_{it} = 0 \qquad \text{if } \delta z_{it} + v_{it} \leq 0$$

$$\text{Regime 1: } ln(W_{it}) = \alpha_{0,1} + \gamma_1' \omega_{it} + \alpha_{1,1} ln(P_{it}) + \beta_1' x_{it} + u_{1,it} \qquad \text{if } I_{it} = 1 \tag{3}$$

$$\text{Regime 2: } ln(W_{it}) = \alpha_{0,2} + \gamma_2' \omega_{it} + \alpha_{1,2} ln(P_{it}) + \beta_2' x_{it} + u_{2,it} \qquad \text{if } I_{it} = 0 \tag{4}$$

The explanatory variables z in the criterion function, which determines selection into entrepreneurship, include the variables in x and additionally the dummy variables used as IVs mentioned above. These additional variables thus serve as exclusion restriction here. Under the assumption that the error terms v, u_1 and u_2 follow the trivariate normal distribution, the model is estimated using the maximum likelihood method. We will use a restricted version of the model, where the coefficients do not differ between the two regimes, to test for the significance of the difference between the regimes. The restricted model corresponds to a treatment effects model (Heckman, 1978), where entrepreneurship is understood as the treatment. Furthermore, as part of the robustness analysis, we will check how excluding business equity from the wealth measure influences the estimate of precautionary savings (strategy 3).

4. Dataset and Sub-Samples

This analysis is based on data from the Socio-Economic Panel (SOEP), a representative annual household panel survey in Germany started in 1984. Wagner et al. (2007) provide a detailed description of the data. We use all waves available (1984-2007) to estimate permanent income and income uncertainty measures. The waves of 2002 and 2007 included a special module collecting information about private wealth. Thus, the main analysis refers to these two periods. The interviewers asked for the market value of personally owned real estate (owner-occupied housing, other property, mortgage debt), financial assets, tangible assets, private life and pension insurance, consumer credits, and private business equity (net market value; own share in case of a business partnership). The wealth balance sheets were elicited at the personal level. In case of jointly owned assets, the personally owned shares were explicitly asked for. For the purpose of this analysis, we aggregate wealth and income data to the household level for the reasons mentioned in Section 2.[8]

Fuchs-Schündeln and Schündeln (2005) also used the SOEP, but only until the wave of 2000, so direct wealth information was not available. Instead, they relied on the flows of received amounts of interest and dividend payments to estimate financial wealth using the yearly average interest and dividend yields in Germany. Apart from the low precision in the amount of financial wealth estimated this way, another disadvantage of this approach was that no wealth components other than financial assets could be considered (the implications will be discussed in Section 7).

An entrepreneurial household is defined as a household owning a private business with a positive value, as in Hurst et al. (forthcoming). We exclude households whose heads are younger than 18 or older than 55 from the sample, because youth or older consumers in the years immediately preceding retirement are not expected to engage in buffer-stock saving (cf. Carroll, 1997). For the same reason pensioners, individuals in education or vocational training,

8 Apart from that, the personal characteristics of the household's head are associated with the household. As head of household the earner is determined who has the highest gross monthly income. In case both earners have exactly the same gross monthly income, the SOEP's definition of household head is used.

interns, those serving in the military or community service, the unemployed, and those not participating in the labor market are excluded.[9] In the sample of 2002 and 2007, 6,303 observations of households-years remain, 474 of which refer to entrepreneurial households.

Table 1 provides the means of the variables in this sample and the sub-samples of entrepreneurial and non-entrepreneurial households. At the bottom of the table, the means of total net worth,[10] net financial wealth (financial assets minus debt from consumer credits) and wealth held in private businesses are shown. The latter is zero for non-entrepreneurial households by definition. All monetary variables are deflated using the consumer price index provided by the Federal Statistical Office.

It is obvious that entrepreneurial households differ from other households. Their total net worth is on average more than six times larger than that of non-entrepreneurial households. This comparison of assets exaggerates the wealth difference between entrepreneurs and the remaining population, however, as it does not consider the statutory pension insurance entitlements of the dependently employed in Germany. Assuming an average monthly pension of 1000 euro and a remaining life expectancy at the age of 65 (retirement age in Germany) of 18.5 years (Deutsche Rentenversicherung, 2007), average public pension wealth amounts to 222,000 euro. Thus, on average employees have a lower total net worth than entrepreneurs even after consideration of public pension wealth, but the gap becomes much smaller. Entrepreneurs also enjoy a higher level of permanent net income, in part because usually they do not pay social security contributions (the construction of permanent net income will be described in the next section).

Another interesting observation is the large share of private business equity in total net worth of entrepreneurial households (see also Fossen, 2008). This underlines that total wealth holdings may be correlated with entrepreneurship for reasons unrelated to precautionary

9 The results remain qualitatively similar if the cut-off point for age is chosen to be 50 or 65, or if unemployed and non-participating individuals are included in the sample (available from the authors upon request). In this paper we focus on labor income risk and do not analyze the effect of unemployment risk on precautionary saving. For an investigation of the latter, cf. Engen and Gruber (2001).

10 Total net worth is the sum of housing and other property (minus mortgage debt), financial assets, the cash surrender value of private life and pension insurance policies, tangible assets, the net market value of commercial enterprises, minus debt.

Table 1: Descriptive Sample Statistics: Means (Medians in Brackets)

Variables	Total	Non-Entrepreneurs	Entrepreneurs
Characteristics			
Age of household head	41.48	41.43	42.27
Female household head	32.76	33.26	25.32
Number of children	0.62	0.61	0.75
Married households	51.63	51.06	60.19
Eastern households	18.61	18.61	18.71
German households	94.48	94.26	97.61
Self employed father	7.77	7.29	15.03
Father has Abitur*	13.81	13.37	20.42
Mother has Abitur*	6.14	5.84	10.37
Highest educational attainment			
Apprenticeship	34.91	35.84	21.04
Technical school or Abitur*	7.61	7.70	6.37
Higher technical college oder similar	22.35	21.88	29.25
University degree	28.58	27.84	39.67
Monetary variables (euro in 2002 prices)**			
Net worth	89,112	67,714	408,277
	(10,000)	(7,250)	(172,602)
Net financial wealth	12,008	11,132	25,060
	(0)	(0)	(462)
Wealth in enterprise	11,649	0	185,393
	(0)	(0)	(36,000)
Permanent income	32,695	31,937	44,007
	(31,771)	(31,192)	(42,913)
Percent of sample	100.00	92.48	7.52
Number of observations	6,303	5,829	474

Note: All numbers except for age and number of children are in percentage. Source: Own calculations based on the SOEP. Statistics are shown for 2002 and 2007; the calculation of permanent income is based on the waves 1984-2007.

* Abitur: university entrance qualification.

** Median values are shown in brackets below the means.

savings.

As expected, the fraction of entrepreneurs with a self-employed father is much higher than that of non-entrepreneurs. Furthermore, more entrepreneurs than non-entrepreneurs have parents with university entrance qualification (Abitur). These variables are thus suggesting themselves as candidates to serve as instruments for entrepreneurship.

5. Construction of Permanent Income and Income Risk Measures

Permanent income (as presented in Table 1) as well as the measures of income uncertainty are estimated based on household net income information contained in all waves available in the SOEP. It is assumed that income depends on a trend due to demographic and human capital factors x_{it}^1 and a transitory component e_{it} so that yearly net household income[11] y_{it} can be written as

$$ln(y_{it}) = b'x_{it}^1 + e_{it}. \tag{5}$$

The x^1 vector contains the variables in x and additionally dummy variables indicating the household head's highest educational attainment (see Section 3).[12] To approximate permanent income, $y_{it}^P := \hat{y}_{it}$ is predicted after OLS estimation of equation (5),[13] as in Lusardi (1998).[14]

To be able to estimate equation (2), a measure of income uncertainty is needed. Because theory is lacking an appropriate specification that captures the relationship between uncertainty and wealth, in the literature atheoretical measures of uncertainty are used. In this paper five alternative measures are constructed to estimate the size of precautionary wealth.

The first measure of income variance is based on estimating a heteroscedasticity function. After estimation of equation (5), the squared residuals $(ln(y_{it}) - ln(\hat{y}_{it}))^2 = \hat{\sigma}_{it}^2$ are obtained. To estimate the heteroscedasticity function, an OLS regression of $ln(\hat{\sigma}_{it}^2)$ on the x^1 variables is conducted. Then the fitted values **lvarly I** are obtained. This measure contains the

11 Yearly net household income is approximated by multiplying current monthly net household income by 12.

12 In the specifications that maintain the exogeneity assumption of entrepreneurship in the wealth equation (2), which are used primarily to compare results to the existing literature, a dummy variable indicating entrepreneurial households is included in x^1 as well. The dummy is dropped from x^1 in the preferred IV model with endogenous entrepreneurship and the endogenous switching model in order to use exogenous variation in earnings risk and permanent income only. Furthermore, the dummy variables indicating the risk attitude are excluded from x^1, since these are only available in 2004 and 2006.

13 To obtain consistent predictions $\hat{y}_{it}$, the predicted values from the log model must be exponentiated and multiplied with the expected value of $exp(e_{it})$. A consistent estimator for the expected value of $exp(e_{it})$ is obtained from a regression of y_{it} on the exponentiated predicted values from the log model through the origin. This procedure does not require normality of $exp(e_{it})$.

14 Similar levels of permanent income are obtained when the method used by Fuchs-Schündeln and Schündeln (2005) is replicated.

logarithm of the expected variance of log income conditional on observed characteristics and can be interpreted as measure of income uncertainty. By applying the exponential function on lvarly I, we obtain **varly I** as an alternative measure.

Another approach used in the literature to measure income uncertainty is to calculate the income variance in certain sub-samples. We divide the sample into four occupation groups (civil servants, self-employed, white-collar workers, blue-collar workers) and five categories of educational attainment (university, higher technical college or similar, technical school or Abitur, apprenticeship, other) to construct 20 cells associated with a cell-specific income uncertainty, which is measured as the variance of the logarithm of income. We will refer to this measure as **varly II** and to the logarithm of varly II as **lvarly II**. Carroll and Samwick (1998) additionally consider sector groups. They demonstrate that the relationship between the logarithm of the variance of log income and the logarithm of the target wealth ratio, as predicted by the buffer stock-model, can be fitted well linearly, which supports the specification of the estimation equation. The logarithm is also used by Fuchs-Schündeln and Schündeln (2005) as a conventional risk measure.

Carroll and Samwick (1997) and Hurst et al. (forthcoming) decomposed the income variance into permanent and transitory components. In an additional specification we follow this method, which is presented in Appendix A, in order to compare the results.

Since varly II, lvarly II, and the decomposed variance components could embody substantial measurement errors, we will employ a GMM IV-estimator in the wealth equations using these measures, as done in the literature mentioned, using dummy variables indicating the household head's highest educational attainment as excluded instruments.

The sample means of the uncertainty measures varly I and varly II presented in Table 2 clearly confirm that entrepreneurial households face higher income risk than other households. The difference persists when the estimated variance is normalized by the mean (the variation coefficients are reported in square brackets). When the variance is decomposed into a permanent and a transitory component, both components turn out to be larger for entrepreneurs.

Table 2: Estimated Income Variance Measures

	Total Sample	Non-Entrepreneurs	Entrepreneurs
varly I	0.1958	0.1850	0.3563
	(0.1001)	(0.0834)	(0.1677)
	[0.0418]	[0.0409]	[0.0549]
varly II	0.2490	0.2409	0.3704
	(0.0799)	(0.0689)	(0.1235)
	[0.0490]	[0.0482]	[0.0595]
Permanent variance	0.0125	0.0119	0.0217
	(0.0789)	(0.0756)	(0.1178)
Transitory variance	0.0515	0.0498	0.0768
	(0.1703)	(0.1666)	(0.2159)
Number of observations	6,303	5,829	474

Note: Standard deviation in parentheses. The variance components do not add up to the total variance measures because only the detrended part of the total variance is decomposed (see Appendix A). Coefficient of variation (sd/mean) in square brackets. Source: Own calculations based on the SOEP 1984-2007; statistics are shown for 2002 and 2007.

Compared to the results of Carroll and Samwick (1997) and Hurst et al. (forthcoming), in the total sample the average permanent variance is higher in the USA than in Germany. This may be explained by Germany's labor legislation, which may reduce wage risk. The average transitory variance is almost the same, thus idiosyncratic shocks do not seem to differ much between the two countries.

The descriptive analysis shows that entrepreneurial households have a greater stock of wealth on average and a more volatile labor income compared to other households. This underlines the importance of controlling for entrepreneurial status, as discussed in Section 3.

6. Empirical Results Accounting for Entrepreneurship

6.1. Coefficients of Income Risk Decrease

Table 3 shows the results from estimating equation (2) using the two alternative measures of income uncertainty varly I (upper panel) and lvarly I (lower panel). The five columns refer to different specifications, as will be described below. The dependent variable is the logarithm

of total net worth.[15] Additionally to the coefficients of each measure of earnings risk, the estimated coefficients of the logarithm of permanent income and of the entrepreneurship dummy variable, if included, are shown for each specification. The estimated coefficients of the control variables x are reported in Appendix Table B.1 for specification Pooled 3 (IV-estimation on the pooled sample including an entrepreneurship dummy).[16]

Table 3: Estimates of the Effect of Labor Income Risk on (ln) Net Worth

				Endogenous Switching Model	
	Pooled 1	Pooled 2	Pooled 3 (IV)	Non-Entrepreneurs	Entrepreneurs
varly I	4.8400***	1.6009**	-0.1594	-0.3275	4.4404
	(0.4204)	(0.7678)	(1.1429)	(1.1569)	(4.1881)
ln Perm. Income	1.7380***	1.3976***	1.1771***	1.3168***	0.3460
	(0.1522)	(0.1605)	(0.1895)	(0.1834)	(2.2513)
Entrepreneur		0.7653***	2.8075***		
		(0.1288)	(0.5473)		
lvarly I	1.3001***	0.0057	0.0138	0.0288	1.1853
	(0.0937)	(0.3512)	(0.3721)	(0.3812)	(1.2485)
ln Perm. Income	1.4808***	1.3795***	1.1787***	1.3166***	0.2536
	(0.1595)	(0.1604)	(0.1904)	(0.1840)	(2.2836)
Entrepreneur		1.0171***	2.7941***		
		(0.2623)	(0.5491)		

Note: ***/**/* indicates significance at the 1%/5%/10% levels. Robust standard errors in parentheses. Pooled 1: Without controlling for entrepreneurship, Pooled 2: Using controls for entrepreneurship, Pooled 3: Using instrumented controls for entrepreneurship. Right two columns: Endogenous switching model with distinct regimes for entrepreneurial and non-entrepreneurial households. Source: Model estimations based on the SOEP 02/07; income variable estimations based on waves 1984-2007.

The first column shows the estimates without controls for entrepreneurship on the basis of a pooled sample that includes both entrepreneurial and non-entrepreneurial households (Pooled 1). Specification Pooled 2 is based on the full sample and controls for entrepreneurial households using a dummy variable.

As discussed in Section 3, omitting the entrepreneurship dummy in specification Pooled 1 may introduce omitted variable bias, and the entrepreneurship dummy in specification

15 Before taking the logarithm, one euro is added to zero wealth observations. We proceed analogously to perform the logarithmic transformation of other variables.

16 For the other specifications, the estimated coefficients of the control variables are available from the authors upon request.

Pooled 2 may be endogenous. Therefore the preferred specification is the IV model Pooled 3. As mentioned, in this specification dummy variables for a self-employed father, university entrance qualification of the household head's parents and his or her own educational attainment are used as IVs for the entrepreneurship dummy.[17] As the analysis of Carroll and Samwick (1998) suggests that the logarithm of the variance of log income has a near linear relationship with log wealth, the preferred measure of income risk is lvarly I.

The last two columns report the estimation results from the endogenous switching regression model. The left and right columns report the estimated coefficients for the regimes faced by non-entrepreneurial and entrepreneurial households, respectively. As mentioned, this specification is more flexible than specification Pooled 3, as it allows the coefficients to differ between the two household types, while accounting appropriately for endogeneity of entrepreneurship as well.[18] The disadvantage of this model is that the coefficients for the entrepreneurs' regime are imprecisely estimated due to the comparably small size of the sub-sample of entrepreneurs (see Section 4).

What are the results with respect to the precautionary saving motive? In specification Pooled 1, which does not control for entrepreneurship, the relationship between income variance and net worth, which might be attributed to precautionary saving, is significantly positive for both measures of income uncertainty. These results replicate the findings in the prior literature that does not account for entrepreneurship. Looking at lvarly I, the estimated coefficient implies that when income uncertainty doubles, total net worth increases by 130%.

Once entrepreneurship is controlled for, however, the picture changes completely. Turning to the specifications accounting for entrepreneurship, which are found in the remaining columns to the right, the point estimates for the income variance coefficients become substantially

17 The strength of these excluded instruments seems to be marginally sufficient. An F-test indicates that they are jointly significant at the 1% level ($F = 9.38$, if varly I is used, and $F = 11.14$ for lvarly I) in the first stage regression of the entrepreneurship dummy variable on all instruments; Shea's Partial R^2 is 0.0148 (0.0146), when varly I (lvarly I) is used. The Hansen test of overidentifying restrictions is not rejected (the p-value is 0.7044 using varly I, and 0.5703 using lvarly I).

18 The variables excluded from the criterion function, which are identical to the excluded instruments in specification Pooled 3, are jointly significant at the 1% level in the selection equation ($\chi^2_7 = 21.04$ for varly I, $\chi^2_7 = 20.92$ for lvarly I).

smaller, in two cases even negative, regardless of whether varly I or lvarly I is used. There is no longer a significant relationship between income uncertainty and total net worth. The only exception to this is specification Pooled 2 using varly I, where the point estimate is also substantially smaller than without controlling for entrepreneurship, but still significant. As argued above, the logarithm lvarly I is the preferred measure because of the better functional fit, however. The coefficient in the entrepreneurs' regime of the switching regression model is the only one that does not become substantially smaller in comparison to specification Pooled 1. This is not inconsistent with the general result, as for this regime the estimated coefficient has a large standard error for the reasons mentioned above, and is not significantly different from zero. Overall the results clearly show that given the heterogeneity between entrepreneurial and non-entrepreneurial households, not controlling for entrepreneurship causes spurious correlation between income uncertainty and wealth and leads to an upward bias of estimations of precautionary savings.

The estimated coefficient of the entrepreneurship dummy in the preferred specification Pooled 3 indicates that the wealth stock held by entrepreneurial households is on average about 15 times larger than that of a non-entrepreneurial household, holding income risk and the other explanatory variables constant, and regardless of whether measure varly I or lvarly I is used.[19]

The relationship between permanent income and total net worth is positive and significant across all specifications and income risk measures, again except for the entrepreneurs' regime of the switching regression model, where the coefficient is insignificant due to a large standard error. Focusing on specification Pooled 3 using the uncertainty measure lvarly I, the estimated coefficient of log permanent net income implies that a doubling of permanent net income increases total net worth by 118%.

The results remain similar when the coefficients (except for the intercept) in the endogenous switching model are restricted to be the same in the two regimes. As mentioned in Section 3,

19 Since the dependent variable is the logarithm of total net worth, this estimate is obtained by calculating $e^{2.7941} - 1 = 15.35$ (based on the specification using lvarly I).

this restricted model accounts for entrepreneurship by interpreting entrepreneurial status as a treatment in the sense of a treatment effects model (Heckman, 1978). As in the other models accounting for entrepreneurship, the coefficient of the earnings variance becomes small and insignificant, regardless of whether varly I or lvarly I is used.[20]

6.2. Results Robust to Alternative Measures of Income Risk

The results from the IV estimations using the measures of income uncertainty varly II and lvarly II and the decomposed variance are reported in Appendix Table B.2. The findings confirm the results discussed above, which were obtained from using the variance measures varly I and lvarly I. In specification Pooled 1 without accounting for entrepreneurship, the estimated coefficient of earnings risk is positive and significant using all the income uncertainty measures. Again the significance is lost and the point estimates become substantially smaller once entrepreneurship is controlled for by including an entrepreneurship dummy assumed to be exogenous (Pooled 2) or endogenous (Pooled 3, using the same additional instruments as before).

The Hansen test of overidentifying restrictions does not indicate invalidity of the instrumental variables.[21] The instruments seem to be sufficiently strong for the income risk measures varly II and lvarly II, as Shea's Partial R^2 is 0.17 and 0.21, respectively. For the entrepreneurship indicator, Shea's Partial R^2 is only 0.017 using both variance measures. A likely reason for the higher correlation of the instruments with the variance measures is that the educational dummy variables used as IVs are also used to define cells for the construction of these variance measures, so the indicator may not be very informative. The strength of the instruments for the decomposed variance measure is clearly non-satisfying, as indicated by a Partial R^2 of 0.0017 for the variance of permanent shocks and 0.0008 for the variance

20 The results are available from the authors upon request. In this paper we report the results of the more general endogenous switching model only, because the restrictions of equal coefficients in the two regimes are rejected by an LR test ($\chi^2_{32} = 111.32$ using lvarly I). The treatment effects model is similar to the IV model Pooled 3, which we prefer, because the former model requires the assumption of normally distributed error terms for consistency.

21 The p-value of this test is 0.5817 (0.5769) using varly II (lvarly II) and 0.3965 for the decomposed variance measures.

of transitory shocks. Hurst et al. (forthcoming) reported similar weak instrument problems. The results based on these variance measures must thus be interpreted with caution; this is the main reason why we prefer the measures varly I and lvarly I.

6.3. Share of Precautionary Savings in Total Net Worth Becomes Small

To quantify the amount of precautionary savings based on the estimated parameters, we follow the literature and compare the predicted net worth of households $\widehat{W}_i$ with the simulated net worth they would hold if they all faced the minimum income risk. The minimum income risk ω^* is approximated by the minimum predicted risk in the sample. A prediction of $\widehat{W}_i^*$, obtained by substituting the households' income risk ω_i by ω^*, can be interpreted as the amount that households would accumulate if they faced the minimum risk. The share of total net worth explained by precautionary saving in the sample is then given by

$$\frac{\sum_{i=1}^{N} \widehat{W}_i - \sum_{i=1}^{N} \widehat{W}_i^*}{\sum_{i=1}^{N} \widehat{W}_i}. \tag{6}$$

Table 4 shows the estimated share of precautionary savings in total net worth, based on the different specifications and measures of income risk. Without controlling for entrepreneurship (Pooled 1), the estimated amount of precautionary savings is large, which replicates results reported in the literature (Carroll and Samwick, 1998). Using the preferred measure lvarly I, it even accounts for 66.84% of total net worth. Once entrepreneurship is controlled for by including a dummy or applying the switching regression model, the point estimates of the shares become substantially smaller (and even slightly negative in two specifications), except for the entrepreneurs' regime in the switching regression model. Even in this regime, the hypothesis that precautionary savings are zero cannot be rejected, because the coefficients of the income variance are insignificant, as in almost all the other specifications accounting for entrepreneurship.[22] Based on the only specification controlling for entrepreneurship which

22 This is also true for the decomposed variance measure. For this measure, the share of precautionary savings is not reported in the table, because the coefficients are too imprecisely estimated and potentially biased due to weak instruments, as mentioned above.

yielded a significant coefficient of the measure of income risk, specification Pooled 2 using varly I, the point estimate for the share of precautionary saving is 17.23%, which is also much lower than without controlling for entrepreneurship (39.01%). Based on the preferred measure lvarly I, the point estimate for the share is close to 0.

Table 4: Percentage of Net Worth Explained by Precautionary Savings

				Endogenous Switching Model	
	Pooled 1	Pooled 2	Pooled 3 (IV)	Non-Entrepreneurs	Entrepreneurs
varly I	39.01	17.23	-1.38†	-2.95†	31.14†
lvarly I	66.84	0.56†	1.12†	2.35†	60.44†
varly II	42.72	1.93†	3.12†		
lvarly II	37.60	1.32†	2.03†		

Note: † calculated on basis of insignificant coefficients. Source: Model estimations based on the SOEP 02/07; income variable estimations based on waves 1984-2007.

7. Discussion

The results are in line with the findings of Hurst et al. (forthcoming), who used data from the USA and showed that estimates of precautionary savings are reduced dramatically once entrepreneurship is accounted for. They still find some evidence that precautionary savings account for a small fraction of wealth in the USA – the coefficient of income risk is positive and significant in some of their specifications, albeit small. In contrast, our analysis of German data shows that no significant effects remain after controlling for entrepreneurship (except for one less preferred specification). The insignificance of income risk is not attributable to the sample size, as the number of observations in our German sample is larger than in the American sample used by Hurst et al. (forthcoming). Not controlling for entrepreneurship in an estimation of precautionary savings, which yields high estimates in both countries, seems to lead to estimated coefficients of earnings risk that are even more upward biased in Germany than in the USA. In the conclusions we will argue that country differences are likely to explain this.

Other estimations of precautionary savings in Germany relied on measures of financial

wealth instead of total net worth as the dependent variable. Specifically, Fuchs-Schündeln and Schündeln (2005) and Bartzsch (2008) estimated the amount of precautionary savings to be about 20% after employing different strategies to control for heterogeneity in risk aversion. As they excluded the self-employed, they avoided the spurious correlation problem arising from pooling non-entrepreneurial and entrepreneurial households without controlling for entrepreneurship. To allow for a comparison, Table B.3 in the Appendix shows estimation results using net financial wealth as the dependent variable. The leftmost column presents results from a sample excluding entrepreneurs, similarly to the two studies mentioned. Using lvarly II as the measure of income risk, which is very similar to one of the measures used in the two studies mentioned, the coefficient of income risk turns out to be positive and significant, which replicates the general results of the two studies. Positive and significant results are also obtained using the preferred specification Pooled 3 (IV-estimation based on the pooled sample with an endogenous entrepreneurship dummy), based on all measures of income risk except for varly I and the decomposed variance measure. The positive effect thus seems to arise when financial wealth is chosen as the dependent variable.

These findings show that households with higher income risk hold more liquid financial wealth such as cash, bonds and shares. Interpreting this as evidence for precautionary saving is problematic, however. Given that the results from using total net worth as the dependent variable indicated that total net worth does not react significantly upon changes in income risk, the changes in financial assets must rather be interpreted as portfolio decisions. The larger amount of financial assets that households with higher income risk hold must be offset by a smaller amount in other assets such as property, holding total net worth constant. It seems plausible that households with more volatile income hold a larger share of their wealth in liquid assets. In the light of the findings from this study, this does not mean that these households save more, however.

As an additional robustness test, total net worth minus the value of a private business is used as the dependent variable. The second column from the right in Table B.3 shows results obtained from substituting the dependent variable in the preferred specification Pooled 3. The

effect of controlling for entrepreneurship does not change: Regardless of the measure of income variance used, the estimated coefficients of income risk are small and insignificant. In the rightmost column of the table, the modified dependent variable is plugged into specification Pooled 1, which does not include an entrepreneurship dummy variable. Here, the estimated coefficients of income risk are smaller than those obtained when total net worth is used as the dependent variable in the same specification, but they are still positive and significant. If the only channel for entrepreneurs' additional saving were investment in their own business, removing business wealth from the wealth measure would be sufficient to avoid the upward bias in the coefficient of earnings risk that results from not accounting for entrepreneurship. The results from this last test show that this does not seem to be true, at least in Germany, and invalidate the approach referred to as potential strategy 3 in Section 3. It is very plausible that additional savings of entrepreneurs that are unrelated to the precautionary motive, e.g. savings for old age consumption in order to make up for the lack of statutory pension insurance, are not exclusively concentrated in their business, but also in other assets such as property and private pension insurance.

8. Conclusion

Empirical estimates of large amounts of precautionary savings disappear once the heterogeneity between entrepreneurial and non-entrepreneurial households is accounted for, as reported by Hurst et al. (forthcoming) using data from the USA. This paper is the first to confirm the result in a different country by revising estimates of precautionary savings in Germany. While Hurst et al. (forthcoming) still find some evidence that precautionary savings account for a small fraction of wealth in the USA, the results from this study based on the preferred specifications actually show that no significant estimates of precautionary savings remain in Germany once entrepreneurship is controlled for.

Hence, not controlling for entrepreneurship in an estimation of precautionary savings, which yields high estimates in both countries, is even more misleading in Germany than in the USA. A possible explanation is that the difference in the saving behavior between entrepreneurial

and non-entrepreneurial households is even more pronounced in countries with an extensive social security system such as Germany than in a country following the Anglo-Saxon model. In Germany, employees are covered by statutory pension insurance, while entrepreneurs have to save for their old age consumption. Thus, the extra saving of entrepreneurs is likely to be due to their exclusion from the social security system. Pooling together the two household types without controlling for entrepreneurship misleadingly connects the higher savings of entrepreneurs to their higher income risk and leads to an upward bias in estimates of precautionary savings.

Prior studies which estimated precautionary savings in Germany, particularly Fuchs-Schündeln and Schündeln (2005) and Bartzsch (2008), analyzed the effect of income risk on certain components of wealth such as net financial wealth. They interpreted their results as evidence for precautionary savings. While these results can be replicated, in this paper it is shown that there are no significant effects of income risk on total net worth. Thus, higher income risk seems to be associated with a portfolio shift towards more liquid assets, but not with more saving.

Methodologically, the main innovation in this study is that entrepreneurship is recognized as being endogenous with wealth, as suggested by the large literature on credit constraints faced by nascent entrepreneurs. This study employs IV estimators and an endogenous switching regression model, where entrepreneurial and non-entrepreneurial households face different regimes, to deal with this endogeneity.

Estimates of precautionary saving are important for policy design, especially labor market, social security, and taxation policy, as these policies directly affect the variance of households' net income. Governments in Western welfare states have tended to downsize the social security system during the last decades. At the same time, collective labor agreements have lost importance in some countries such as Germany. Prior estimates of precautionary saving suggested that households would considerably increase their savings due to the rising income uncertainty. In contrast, the new findings in this study, which account for the important role of entrepreneurship, imply that no significant effects on the savings rate are to be expected.

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Appendix

A. Construction of the Variance of Permanent And Transitory Income

By exploiting the panel structure of income observations contained in the SOEP dataset, the variance of innovations to permanent income can be separated from transitory shocks to income. We follow the method proposed in Carroll and Samwick (1997) for comparability.

The income process is characterized by three components.

$$ln(y_t) = ln(G_t) + ln(y_t^P) + \varepsilon_t, \tag{7}$$

where $ln(G_t)$ represents demographic and human capital factors, $ln(y_t^P)$ a permanent component, and ε_t a transitory white noise component of income with variance $\sigma^2_{\varepsilon_t}$. Permanent income is modelled as random walk:

$$ln(y_t^P) = ln(y_{t-1}^P) + \eta_t, \tag{8}$$

where the variance of a shock to permanent income is σ^2_η. The shocks η_t and ε_t are assumed to be uncorrelated in all periods.

To estimate σ^2_η and $\sigma^2_{\varepsilon_t}$, first the trend $ln(G_t)$ is removed by a cross-sectional OLS regression of $ln(y_t)$ on the variables included in x^1, which yields as residuals the detrended income $\hat{y}_t$. The next step is to calculate the d-year differences of detrended income: $r_d = \hat{y}_{t+d} - \hat{y}_t$, which can be written using equations (7) and (8) after the trend has been removed as

$$r_d = \sum_{s=1}^{d} \eta_{t+s} + \varepsilon_{t+d} - \varepsilon_t. \tag{9}$$

Now the variance $r_d^2 = d\sigma^2_\eta + 2\sigma^2_\varepsilon$ can be estimated. To extract all information available, household by household OLS regressions of r_d^2 on d and a constant are conducted using all possible differences at least three years apart (Table A.1). This way, each household's permanent and transitory variance components can be estimated based on up to 210 observations, in con-

Table A.1: Observations used to estimate households variances

d=3	d=4	$\cdots$	d=23
1987-1984	1988-1984	$\cdots$	2007-1984
1988-1985	1989-1985		
$\vdots$	$\vdots$		
2006-2003	2007-2003		
2007-2004			
20	19	$\cdots$	1

trast to only nine observations in Carroll and Samwick (1997) and Hurst et al. (forthcoming). Households for which only 3 or less observations are available are not considered.

B. Additional Estimation Results

Table B.1: Complete Estimation Results Using Specification Pooled 3 (Dep.: ln Net Worth)

	varly I	lvarly I	varly II (IV)	lvarly II (IV)	decomp IV
d2007	-0.1240**	-0.1166	-0.1193**	-0.1191**	-0.0216
	(0.0568)	(0.0807)	(0.0429)	(0.0430)	(0.0654)
female	-0.1414**	-0.1470**	-0.1493**	-0.1488**	-0.0329
	(0.0615)	(0.0743)	(0.0574)	(0.0585)	(0.1331)
Region (Base: West)					
east	-0.1840**	-0.1825**	-0.1855**	-0.1848**	-0.1734*
	(0.0657)	(0.0656)	(0.0666)	(0.0667)	(0.0998)
south	0.2521***	0.2538***	0.2545***	0.2542***	0.2162**
	(0.0523)	(0.0535)	(0.0518)	(0.0519)	(0.0964)
north	0.0102	0.0127	0.0129	0.0126	0.0115
	(0.0728)	(0.0742)	(0.0719)	(0.0720)	(0.1127)
age	0.0066	0.0114	0.009	0.0092	-0.0258
	(0.0456)	(0.0519)	(0.0384)	(0.0384)	(0.1102)
age sq.	0.0004	0.0003	0.0004	0.0004	0.0005
	(0.0006)	(0.0007)	(0.0005)	(0.0005)	(0.0012)
work exp. (10 yrs)	0.3469**	0.3530**	0.3627**	0.3594**	0.1833
	(0.1633)	(0.1747)	(0.1675)	(0.1675)	(0.3312)
work exp. sq. (100 yrs)	-0.056	-0.0557	-0.058	-0.0574	0.0137
	(0.0404)	(0.0403)	(0.0412)	(0.0412)	(0.0885)
unemployment exp.	-0.2521***	-0.2510***	-0.2520***	-0.2517***	-0.24
	(0.0545)	(0.0543)	(0.0539)	(0.0539)	(0.1496)
unemployment exp. sq.	0.0228**	0.0226**	0.0227**	0.0227**	0.0243
	(0.0076)	(0.0075)	(0.0074)	(0.0074)	(0.0180)
disabled	0.0238	0.0262	0.0256	0.0254	-0.0285
	(0.0944)	(0.0968)	(0.0935)	(0.0935)	(0.1355)
german	0.4541***	0.4596***	0.4611***	0.4596***	0.6583***
	(0.1190)	(0.1285)	(0.1173)	(0.1170)	(0.1467)
Number of Children (Base: no child)					
one child	0.1009	0.1058	0.1044*	0.1045*	0.0839
	(0.0615)	(0.0745)	(0.0579)	(0.0580)	(0.0744)
two children	0.1886**	0.1964*	0.1944**	0.1940**	0.1679
	(0.0738)	(0.1088)	(0.0668)	(0.0668)	(0.1565)
three or more	0.3062**	0.3150**	0.3140***	0.3132**	0.2408
	(0.1009)	(0.1343)	(0.0952)	(0.0953)	(0.2491)
Marital Status (Base: Single)					
married	-0.0589	-0.0272	-0.0307	-0.0325	-0.2196
	(0.1737)	(0.2821)	(0.0803)	(0.0802)	(0.1853)
divorced	-0.4023***	-0.3947***	-0.3971***	-0.3968***	-0.4043*
	(0.1008)	(0.1060)	(0.0959)	(0.0959)	(0.2321)
separated	-0.4194**	-0.4018*	-0.4075**	-0.4072**	-0.3484

Continued on next page

Table B.1: Complete Estimation Results Using Specification Pooled 3 (Dep.: ln Net Worth)

	varly I	lvarly I	varly II (IV)	lvarly II (IV)	decomp IV
	(0.1842)	(0.2058)	(0.1609)	(0.1609)	(0.3140)
Willingness to take risks (0-10) (Base: risk0 – risk averse)					
risk1	-0.0471	-0.0463	-0.0453	-0.0454	0.0875
	(0.2284)	(0.2284)	(0.2284)	(0.2284)	(0.2964)
risk2	0.2172	0.2172	0.2156	0.2158	0.4264
	(0.1734)	(0.1731)	(0.1732)	(0.1732)	(0.2716)
risk3	0.1097	0.1099	0.1096	0.1093	0.1891
	(0.1672)	(0.1672)	(0.1672)	(0.1672)	(0.2414)
risk4	0.0445	0.0448	0.0448	0.0444	0.11
	(0.1695)	(0.1694)	(0.1695)	(0.1695)	(0.2643)
risk5	-0.0143	-0.0137	-0.0139	-0.0141	0.032
	(0.1648)	(0.1647)	(0.1647)	(0.1647)	(0.2754)
risk6	0.1114	0.1119	0.1103	0.1104	0.169
	(0.1666)	(0.1665)	(0.1665)	(0.1666)	(0.2723)
risk7	0.0182	0.0189	0.018	0.0179	0.1168
	(0.1713)	(0.1714)	(0.1714)	(0.1714)	(0.2568)
risk8	0.1167	0.1178	0.1166	0.1167	0.2649
	(0.1804)	(0.1804)	(0.1804)	(0.1805)	(0.2758)
risk9	-0.0169	-0.0149	-0.0162	-0.016	0.169
	(0.2202)	(0.2203)	(0.2201)	(0.2202)	(0.3095)
risk10 – fully prepared	0.3504	0.3541	0.3523	0.353	0.7783
to take risks	(0.3167)	(0.3165)	(0.3163)	(0.3163)	(0.5446)
Entrepreneur	2.8075***	2.7941***	2.7473***	2.7656***	3.3771*
	(0.5473)	(0.5491)	(0.5775)	(0.5680)	(1.7404)
ln Perm. Income	1.1771***	1.1787***	1.1576***	1.1631***	1.3475***
	(0.1895)	(0.1904)	(0.2085)	(0.2093)	(0.2886)
Measures of Income Uncertainty					
varlyI	-0.1594				
	(1.1429)				
lvarlyI		0.0138			
		(0.3721)			
varlyII			0.1884		
			(0.7551)		
lvarlyII				0.0365	
				((0.1989)	
permvary					-12.8139
					(16.8313)
transvary					-2.395
					(12.9698)
Constant	-3.3031	-3.4235	-3.2497	-3.2097	-3.9577
	(2.1743)	(2.0816)	(2.1608)	(2.3769)	(2.8659)
Observations	5684	5684	5684	5684	4471

Note: ***/**/* indicates significance at the 1%/5%/10% levels. Robust standard errors in parentheses. Pooled 3: Using instrumented controls for entrepreneurship. Source: Model estimations based on the SOEP 02/07; income variable estimations based on waves 1984-2007.

Table B.2: IV-Estimates of the Effect of Labor Income Risk on (ln) Net Worth

	Pooled 1	Pooled 2	Pooled 3
varly II	4.9050***	0.1700	0.1884
	(0.5552)	(0.7185)	(0.7551)
ln Perm. Income	1.4162***	1.3560***	1.1576***
	(0.1958)	(0.1892)	(0.2085)
Entrepreneur		1.0060***	2.7473***
		(0.0945)	(0.5775)
lvarly II	1.1701***	0.0314	0.0365
	(0.1605)	(0.1879)	(0.1989)
ln Perm. Income	1.6647***	1.3634***	1.1631***
	(0.1921)	(0.1879)	(0.2093)
Entrepreneur		1.0132***	2.7656***
		(0.0843)	(0.5680)
Perm. var.	33.4779*	3.3450	-12.8139
	(20.0179)	(30.4036)	(16.8313)
Trans. var.	31.0954***	11.5044	-2.3950
	(6.6433)	(18.3140)	(12.9698)
ln Perm. Income	0.7025	1.1948**	1.3475***
	(0.4896)	(0.5565)	(0.2886)
Entrepreneur		0.6018	3.3771*
		(0.5434)	(1.7404)

Note: ***/**/* indicates significance at the 1%/5%/10% levels. Robust standard errors in parentheses. Pooled 1: Without controlling for entrepreneurship, Pooled 2: Using controls for entrepreneurship, Pooled 3: Using instrumented controls for entrepreneurship. Source: Model estimations based on the SOEP 02/07; income variable estimations based on waves 1984-2007.

Table B.3: Estimates of the Effect of Labor Income Risk on (ln) Net Fin. Wealth (NFW) and (ln) Non-business Net Worth (NBNW)

	Non-Entrepreneurs	Pooled 2	Pooled 3 (IV)	Pooled 3 (IV)	Pooled 1
Dependent Var.	NFW	NFW	NFW	NBNW	NBNW
varly I	0.7442	1.0849	1.6439	-0.0688	3.1740***
	(1.1110)	(0.8069)	(1.2685)	(1.1502)	(0.4309)
ln Perm. Income	1.8160***	1.8816***	1.5236***	1.1335***	1.5178***
	(0.1657)	(0.1565)	(0.2393)	(0.1916)	(0.1520)
Entrepreneur		-0.0315	4.0360***	2.4294***	
		(0.1429)	(0.9283)	(0.6069)	
lvarly I	0.7932**	0.8721**	0.9262**	0.0016	0.8101***
	(0.3317)	(0.3235)	(0.4072)	(0.3746)	(0.0943)
ln Perm. Income	1.7951***	1.8725***	1.5100***	1.1344***	1.3868***
	(0.1652)	(0.1561)	(0.2329)	(0.1925)	(0.1593)
Entrepreneur		-0.4916**	3.7640***	2.4233***	
		(0.2478)	(0.9138)	(0.6079)	
varly II	1.8209**	1.9061**	2.0469**	0.0820	2.9273***
	(0.6785)	(0.6624)	(0.7999)	(0.7582)	(0.5443)
ln Perm. Income	1.6030***	1.6118***	1.3184***	1.1254***	1.3658***
	(0.1796)	(0.1788)	(0.2373)	(0.2100)	(0.1904)
Entrepreneur		-0.0417	3.1503***	2.4023***	
		(0.1020)	(0.9192)	(0.6315)	
lvarly II	0.4578**	0.4963**	0.5308**	0.0163	0.6837***
	(0.1758)	(0.1744)	(0.2133)	(0.1994)	(0.1581)
ln Perm. Income	1.5973***	1.6197***	1.3172***	1.1274***	1.5180***
	(0.1812)	(0.1776)	(0.2393)	(0.2111)	(0.1879)
Entrepreneur		0.0081	3.2798***	2.4101***	
		(0.0921)	(0.9129)	(0.6227)	
Perm. var.	59.8420	40.7497	17.3901	-15.7705	19.6490
	(53.8814)	(35.5923)	(12.3489)	(16.6642)	(16.5820)
Trans. var.	37.1810	24.8911	11.3371	-3.8172	17.1983***
	(25.2078)	(17.2981)	(7.7486)	(11.4341)	(4.0869)
ln Perm. Income	0.5323	0.9949	1.4563***	1.3332***	1.0427**
	(1.1632)	(0.7288)	(0.2899)	(0.2580)	(0.3406)
Entrepreneur		-0.6156	0.8116	3.2478*	
		(0.4498)	(1.4202)	(1.7961)	

Note: ***/**/* indicates significance at the 1%/5%/10% levels. Robust standard errors in parentheses. Non-Entrepreneurs: Sub-sample restricted to non-business owners. Pooled 1: Without controlling for entrepreneurship, Pooled 2: Using controls for entrepreneurship, Pooled 3: Using instrumented controls for entrepreneurship. Source: Model estimations based on the SOEP 02/07; income variable estimations based on waves 1984-2007.