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Precautionary Savings in the Netherlands

Effect of the Great Recession and European Crises

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Abstract:

This paper focuses on the effect of the economic downturns in Europe during 2008-2014 and analyzes whether precautionary savings show deviating levels compared to pre-crisis and post-crisis periods. Precautionary savings in the Netherlands was 5% lower in the period after the crisis when the subjective earnings variance is used as proxy for income uncertainty. When the subjective unemployment risk variance is used as proxy, the pre-crisis period exhibits 10% lower precautionary savings. Risk aversion does not influence the level of one's level of precautionary savings.

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1. Introduction

One of the main assumptions of economic models is an agent to behave rationally and optimize their behavior to maximize returns, welfare or utility. For a long time, savings have been assumed to be irrational and could be attributed to individual psychological flaws. Keynes (1936) argued that savings were instead a rational response to macro-economic circumstances and could be used to maximize one's utility (Watson, 2003). The basic model trying to theorize savings is the two-period model with time separability of utility by Fisher (1930). Assuming no uncertainty and interest rates equaling time preference parameters, consumption levels should be smoothed over the two periods. This relation is conceptualized as the Euler equation.

Under certainty, one can easily smooth consumption over time to maximize utility. At the beginning of a life, one is likely to earn less than at the end. During the working lifetime, one needs to accumulate assets for retirement purposes, to be able to consume after the income flow out of labour has stopped. Without credit constraints, rational consumers have negative assets in the first stage of their life and slowly starts to accumulate assets for retirement purposes. Next to retirement, there are two other main reasons for savings; bequest motives and self-insurance against income uncertainty. In reality people experience income uncertainty and can make appropriate expectations on all future income levels at best. Based on these expectations, one can derive which levels of consumption yield most utility provided the expectations are true. When the individual earns less than expected, e.g. by losing their job, they cannot sustain this level of consumption and have to decrease consumption. To insure oneself against such a shock, people can accumulate assets. When this income drop occurs, one can deplete their assets to be able to consume the same (lower) amount. Risk averse individuals do not like risk, yet without prudence will not exhibit any different behavior than risk-neutral individuals.

Previous papers have not yet reached a consensus on the economic relevance of precautionary saving, nor on the best method to proxy income uncertainty . The first problem arises in conceptualizing a model which captures the precautionary motive, and simultaneously provides a closed form solution. Most scholars agree upon the use of the exponential utility function, which has the downside of the counterintuitive Constant Absolute Risk Aversion (CARA). Another point of debate is choosing the variable to measure income risk. By using subjective measures (Guiso et al., 1992), the perceived risk of individuals is accounted for, and this perception eventually determines one's behavior. Yet this approach suffers from measurement errors (Kennickell and Lusardi, 2004). That provides an argument for the use of objective measures (Carroll, 1992). The different approaches yield different magnitudes for the precautionary savings motive. Subjective measures yield lower values in general than objective, varying between 2% and 30% of total savings (Lusardi and Kennickell, 2004). Yet as

Mastrogiacomo and Alessie (2014) argue, one cannot directly compare different results when sample sizes differ.

What this paper will contribute to existing literature, is measuring the effect of the economic downturn in Europe during 2008-2014 on the earnings variance in the Netherlands. Since the Netherlands has just recently exited a situation of economic downturn, there is little literature on post-crisis effect on precautionary savings. Previous literature has explored the effect of the Great Recession on the subjective income variance (Broadway and Halsken, 2017), yet focusing on Australia which is situated on a different continent with different economic conditions. Additionally, the possible channel through which changes may arise, risk-aversion, has been included as an interaction with income uncertainty, whereas many papers have not done this. Next to the standard proxy of income uncertainty, an alternative measure of income uncertainty, the subjective probabilities of being without a job next year is included in this paper. The additional controls which influence asset accumulation should decrease potential problems of omitted variable bias. The data has been gathered from the Dutch Household Survey over the period of 2004-2016.

The paper continues as follows; section 2 elaborates on the relevant literature; section 3 specifies the theoretical model; section 4 focusses on the data; section 5 provides an overview of the empirical results; and in section 6 a conclusion and policy recommendation can be found.

2. Literature Review

Theoretical model

Approximating a model for precautionary savings is restricted to two options which can provide a closed form solution within a multi-period setting. These are the quadratic and exponential utility function. Solving the Euler equation for quadratic utility functions, one smooths expected consumption over time. This level of consumption is equal to a person's permanent income. Friedman (1957) defined this as the expected average income an individual will earn annually based on its personal characteristics. Within this framework, consumption only depends on the current expectation of all future labour income. There is no prudence (which require a positive third derivative of the utility function) in this model and without positive prudence individuals will not respond to uncertainty. In the model with quadratic utility, individuals behave identical to a situation without uncertainty. The outcome of consumption with uncertainty but without prudence is therefore called "the Certainty Equivalent (CE)". Testing the CE against actual data, consumption overreacts to shocks in income (Kimball, 1990-a) and excess smoothing is exhibited, which are two of the many consumption puzzles.

The alternative for the CE is using the exponential utility function, which has the drawback of exhibiting CARA. Under CARA, one's risk aversion is independent of wealth, yet as proven by Kimball (1990-b), individuals show decreasing absolute prudence, and thus decreasing risk aversion. Additionally, the model allows for negative consumption. Exponential functions do yield positive prudence, thus one will decrease current consumption due to uncertainty. Higher wealth buffers provide more security against income risk and offers room for an increasing consumption pattern over time (Caballero, 1989) [1] as Equation (1) illustrates. This increase in consumption is in line with empirical data on the development of wealth over time.

$$C_t = r * A_{t-1} + y_t - \frac{\theta * \sigma^2}{2} \quad (1)$$

C_t is consumption at time *t*, *r* is the interest yield which is gained or must be paid over the level of assets of the previous period (A_{t-1}). y_t represents the labour income at time *t*. The third term illustrates the precautionary savings term, where θ is absolute risk aversion and σ^2 is variance of the labour income, representing the uncertainty. This precautionary motive decreases current consumption, yet with increasing asset levels, consumption increases with time. This effect increases with an increase in absolute risk aversion and variance in labour income. The Caballero model has been able to explain overshooting in consumption after income shocks. If wealth drops, one needs to decrease consumption drastically to obtain the desired precautionary buffer as quickly as possible.

Weil (1993) introduced a 'Constant Elasticity of Substitution' (CES) utility function to overcome the possibility of negative consumption. This specification still needs CARA to find a closed form solution. Weil (1993) recognized the simplicity of the model as its main shortcoming.

A group of scholars (see Jappelli et al., 2007; Heaton and Lucas, 1997; Carroll, 1992), extended the standard measure of precautionary behavior by introducing the 'buffer stock model'. This model assumes people strive for a stable wealth/income ratio, which requires tracking of income and precautionary savings to hold. The last condition is needed to prevent lifetime smoothening of consumption. Empirical data has not coincided with this theory yet.

Measurement of earnings variance

Results of different papers on the economic significance of precautionary savings varied between constituting only 2 percent of household of household household's net worth (Guiso et al., 1992) and substantial amounts of 46 percent (Carroll and Samwick, 1998). Lusardi and Kennickell (2004) and Mastrogiacomo and Alessie (2014) have compared the results of the most influential papers and both argued that the differences are caused by the different measures of income uncertainty, with objective measures obtaining higher levels than subjective measures.

[1] The assumption behind this model is the absence of bequest motives and habit formation, which make the underlying utility function time separable. Agents are assumed to have infinite lives with no risks except for labour income.

There are two ways to measure objective income uncertainty based on Kimball (1990 - a); the Equivalent Precautionary Premium (EPP) and the log of the variance of the log of income (lnvarly). EPP is the theoretical definition of precautionary savings. It is comparable to a risk premium, which is the amount of money someone would like to sacrifice to take away the risk over next period's wealth. The EPP is defined as the amount of money one would like to save in order to have a riskless level of wealth in the next period(s). When uncertainty prevails, this optimal level of savings can be found by satisfying the condition of equal marginal utility of consumption in for situations with and without savings. Many studies that use objective measures adopt the log of the variance of log income as a proxy for income uncertainty, which is easier to compute since no assumptions on the utility function are needed (Broadway and Halsken, 2017). Carroll and Samwick (1998) adapted both objective measures and found, using simulations, that under the Panel Study of Income Dynamics (PSID) respondents in the USA from 1981-1987, wealth is reduced with 36% of net worth if all respondents faced the same uncertainty as the group with the lowest uncertainty.

Guiso et al. (1992) argued that subjective measures based upon survey-data are the superior measures of income uncertainty to find the size of precautionary savings based on two arguments. First, using riskiness of job types as proxy yields self-selection problems. When one is risk-neutral, one is more likely to choose a job in which earnings are uncertain than those who are risk averse. Those who have self-selected themselves into jobs with high income uncertainty, are less likely to be risk averse/ prudent and thus will not show more precautionary savings. Another flawed method flawed is using simulations, which would only predict behavior upon assumed parameters, and whether people actually behave as the simulation predicts is unknown. Their study used the SHIW (Survey Household Income and Wealth) which included questions regarding perceived income uncertainty for the next year for all Italian respondents in 1989. They find a small size of precautionary savings of 2%. One might expect that single households face more uncertainty since their household income depends on the income of one person, whereas bigger households have at least two members which can share the risk of one household member experiencing an income drop. As single households face more uncertainty than households with two spouses, the absence of a difference in precautionary savings between the two households could be explained by risk sharing outside the household, e.g. friends helping each other financially when faced with an income change.

Kennickell and Lusardi (2004) attribute the differences between both approaches to the fact that the subjective uncertainty one year ahead does not incorporate enough life time variation to capture all precautionary behavioral responses, whereas the multiperiod approach of objective uncertainty incorporates this better. Their own research focused on the USA, using the Survey of Consumer Finance of 1995 and 1998, which contained information on the desired level of precautionary assets. Approximately 8% of net worth and 20% of financial wealth is built up for precautionary reasons. This effect is most pronounced under the elderly and business owners.

Mastrogiacomo and Alessie (2014) argue that next to different methods, differences between papers are caused by different populations and datasets, which make studies incomparable. Their solution is using the same dataset and estimating the effect based on both an objective (Carroll and Samwick, 1998) and subjective (Guiso et al., 1992) measure. The subjective approach with the income risk as experienced by the head of the household yields precautionary savings shares of 4% of net worth. This is comparable to Lusardi (2007), who studied the effect of precautionary savings in Italy. Many workers have fixed contracts with predetermined wages, causing one year ahead earnings variance to be a weak proxy for earnings uncertainty. This measurement error would lead to endogeneity problems, and thus yields unreliable results. Whereas Lusardi (2007) instrumented earnings variance by regional unemployment rates, Mastrogiacomo and Alessie (2014) used the length of eligibility to unemployment benefits as IV. Both Lusardi (2007) and Mastrogiacomo and Alessie (2014) find higher precautionary shares in savings, reaching 24% of total assets when using the instrument. The instrument does increase the magnitude of precautionary savings up to levels comparable to that of the objective approach, however this does not proof the validity of results (Mastrogiacomo and Alessie, 2014). This result does seem to be able to solve some of the measurement errors of the initial measure. Furthermore, Mastrogiacomo and Alessie (2014) argue that the household uncertainty is larger than solely the head's labour uncertainty. When they re-estimate the above with uncertainty of both spouses, the initial proxy of subjective survey income uncertainty yields a precautionary savings motive of 5% of total savings. When adopting the IV, total precautionary savings is about 30%. To compare the subjective to the objective approach, they constructed the objective precautionary motive as the difference between the actual wealth distribution and the simulated distribution where everyone would face the same low level of labor uncertainty. This approach yielded the result of 30% of savings being explained by precautionary motives, which is the same as under the subjective approach.

Influence Financial Crisis

Broadway and Halsken (2017) developed the idea of Mastrogiacomo and Alessie (2014) and controlled for both objective and subjective uncertainty by including both variables simultaneously in their model, with the change in assets over time as their dependent variable. The data originated from Australia covering a representative population over the period 2002-2014, where a survey was distributed every four years. They find that the subjective term was small and insignificant before the crisis, indicating that at this time, people could estimate their real risk exposure well. Yet after the crisis, the subjective motive significantly increased savings with 3.3 percentage points on top of the objective estimates. This implies overestimation of income risk after the crisis. The joint effect of subjective and objective income risk resulted in 1.5% of savings consisting of precautionary savings on average. Furthermore, they found that those who invested more in non-financial wealth showed higher precautionary savings, and those with higher liquid savings tended to have lower future savings. This is in line with buffer stock behavior. People who had to use up their reserves during the crisis would save more afterwards, and those with higher buffers suffered less from income shocks.

There has been discussion on whether changes in savings behavior during crises originated from precautionary motives or an anticipation of credit restrictions. Carroll et al. (2012) find that the effect of credit restrictions on savings behavior is only small on US citizen during 1966-2010, yet precautionary motives and especially the decrease in wealth affected the savings on a large scale. The side note must be made that excluding the first 14 years makes the fit of the model significantly better. In this period from 1980 onwards, there was excess borrowing in the US. This excess borrowing is called precautionary borrowing by Allan et al. (2012). Individuals anticipate the possibility of recessions and credit restrictions, people can exercise the option of getting a loan before any recession. During the economic downturn one might not be able to obtain loans, thus precautionary borrowing ensures the access to additional credit. Allen et al. (2012) argue that if precautionary motives would not be of importance, assuming temporarily shocks of the crisis, one would decumulate savings in order to smooth consumption during the crisis. When the crisis starts, the value of assets falls, and people want to de-lever to maintain their desired leverage ratio. However, what was observed during the Great Recession was an increase in savings combined with a decrease of debt for all age groups. If the diminishing supply of credit would cause the increase of savings instead of precautionary motives, young adults, who did not have the opportunity to demonstrate precautionary borrowing, should show a fall in savings to maintain constant consumption levels, and the elderly should dis-save and deplete their buffer. Allen et al. (2012) find an increase in savings of 4% during the recent recession under all age groups in the United Kingdom. The savings rates return to the initial ones from before the crisis when perceived uncertainty drops again. Mastrogiacomo and Alessie (2011) also find that precautionary savings is equal for all ages and cohorts, which is counterintuitive, as the elderly should have already built up enough precautionary buffer and face less future income risks. Broadway and Halsken (2017) excluded the population older than 50 years from their sample. Based upon intuition and theory this is a valid assumption, however based upon the finding of Mastrogiacomo and Alessie (2011) they should have included those exceeding the age of 50.

Many other scholars have also studied the effect of the Great Recession on the importance of precautionary savings. As Mody et al. (2012) argued, by 2012 the world still has not recovered fully from the Great Recession, and it is unknown how long this increased uncertainty will stay. Their study focused on comparing the macro data of 27 developed countries during 1980-2010, and found that if uncertainty increases, measured by unemployment risk and GDP volatility, savings increases. 40% of the world savings can be attributed to precautionary actions against uncertainty. Additionally, they found that the uncertainty of the size of investment returns hardly had influenced total savings.

Determinants of savings

A channel through which the crisis affects consumers is changes in wealth. Maki and Palumbo (2001) use micro- and macro-economic data on the US of 1989-1998, a period of booming equity markets, to see how consumption changes due to changes in wealth. The decrease in the propensity to save is mainly attributed to individuals who were heavily invested in equity. This would suggest people are affected by increases in equity wealth. Yet Paiella (2007) studies the same effect in Italy with the SHIW of 1991-2002 and finds only a small effect of the booming economy on consumption. Like other scholars, (Maki and Palumbo, 2001) she suggests the possibility of reversed causation or even an unobservable economic variable that causes the positive relationship between stock value and consumption. A direct effect of stock value on consumption, would only affect the consumption propensity of the small elite who hold many assets. Moreover, until the gains have been realized, uncertainty about the real gains remains. Due to mental accounts, individuals classify certain investments as long-term investments. Then individuals are not willing to close these accounts (e.g. sell stocks) in the short-term, leading to unrealized gains and remaining uncertainty. This could also explain that the propensity to consume out of housing wealth is lower than financial wealth, as real estate is considered to be an alternative way of financing their retirement (Mastrogiacomo and Alessie, 2011).

Zandi (1999) argues that this overconfidence due to thriving economic markets affect all, not only those who invest in stocks. This overconfidence could lead to overconsumption before the crisis, resulting in too small buffers, leading to a substantial increase in savings during and after the crisis when confidence drops. Response to the economic conditions differs between nations, Italians exhibited increased investments in stocks, whereas the US households realized equity gains when the economy thrived before the crisis.

Next to the influence of uncertainty on investments and wealth, there are multiple explanatory variables which could influence the level of savings. As Naranjo and Van Gameren (2016) mentioned, when individuals struggle financially they might want to increase savings, yet they are unable to insure themselves through precautionary savings. Furthermore, Collins (2012) finds that financial literacy is needed to optimize utility through self-insurance.

Based upon previous research, this paper expects that precautionary savings increase during the crisis as subjective uncertainty will increase and return to normal levels when the economy has recovered. The effect of the crisis will be stronger under risk averse individuals, who respond stronger to uncertainty changes due to higher prudence levels. The uncertainty of the whole household should be incorporated for the best results. Using proxies regarding unemployment risk should decrease measurement error and incorporate household uncertainty better than one year ahead earnings variance. The additional controls in this paper should decrease omitted variable bias. Wealth levels are expected to be higher for ‘having invested in stocks’, ‘a head or spouse having lost their job during the sample-period’ and ‘being financial literate’ whereas ‘being financially constraint’ would decrease the level of assets.

3. Theoretical Model

The model Caballero (1990) proposed is used by many scholars (Mastrogiacomo and Alessie, 2014; Guiso et al.,1992), and subject to some assumptions (see Equation (1)). The preferences of individuals can be characterized with a CARA utility function, illustrated in Equation (2),

$$u(c_\tau) = -\frac{1}{\theta} * e^{-\theta * c_\tau} \quad (2)$$

Where c_τ represents consumption at time τ and Θ is the coefficient of absolute risk aversion. Prudence, defined as [–(u'''(c_τ)/ u''(c_τ))] is positive, implying there is a motive for rational consumers to save for precautionary reasons.

Labour income (y_{it}) is modelled as an AR(1) process by Mastrogiacomo and Alessie (2014), contrary to the random walk Caballero (1990) assumes. This AR(1) process can be estimated based on an individual's characteristics (x_{it}) and an error term (ε_{it}), which represents possible shocks to income (Equation (3)). The advantage of this approach compared to the random walk is its generality, and allows for predictable income changes over one's lifetime, for example increasing income with age. The unexpected shocks can be modelled as an AR(1) process as well, which main determinant is the persistence (λ) of previous income shocks. This means that once a shock occurred, the agent can optimize its consumption path, regardless of the persistency of previous shocks. The income path is determined by the persistent effect of the income shock of a previous period (ε_{it-1}) and an error term with zero mean (ν_{it}). Persistency is assumed to be homogenous among all individuals, but the variance of the error term of income shocks is heterogeneous, implying different impacts of income shocks.

$$y_{it} = x_{it} * \varphi + \varepsilon_{it} \quad (3)$$

$$\varepsilon_{it} = \lambda\varepsilon_{it-1} + \nu_{it}, \nu_{it} \sim \mathrm{IID}(0, \sigma_i^2) \quad (4)$$

Similar to Caballero (1990), there is neither mortality risk for individuals, nor habit formation. Caballero (1990) assumes infinitely lived agents, yet this paper follows the approach of Mastrogiacomo and Alessie (2014) and Guiso (1992). Working lifespan reaches time 'T', set at 65 similar to Guiso et al. (1992), which was the retirement age in the Netherlands until 2013. Expected lifetime in the Netherlands for the average male in this sample is 81, which exceeds the retirement age.

An agent with a finite life maximizes its utility in accordance with Equation (5). Its decision variable is consumption and the level of built up assets when consumption does not equal income. Simultaneously, the consumer is constraint by its income, which Mastrogiacomo and Alessie (2014) formulate according to Equation (6). A_{t-1} is last year's level of assets and *r* is the discount rate. The left-hand side illustrates total lifetime consumption, and the righthand side total assets over a lifetime.

$$\max \mathrm{E_t} \left[\sum_{\tau=t}^{T} \frac{u(c_\tau)}{(1+\rho)^{\tau-t}}\right] \tag{5}$$

$$\sum_{\tau=t}^{T} \frac{c_\tau}{(1+r)^{\tau-t}} = (1+r)A_{t-1} + \sum_{\tau=t}^{T} \frac{y_\tau}{(1+r)^{\tau-t}} \tag{6}$$

At time τ=0, one starts with zero assets, as any assets accumulated before would be bequests from parents, which do not origin from own labour income. Due to both not allowing for negative assets at time T and no bequest motive, assets equal zero at time T.

Due to mental accounting, housing wealth is often regarded as retirement savings, and individuals do not consume out of this wealth (Mastrogiacomo and Alessie, 2011). By excluding housing wealth from the restriction of zero assets at time T, agents do not take zero assets into retirement. Additionally, Paiella (2007) found that propensity to consume out of wealth gains was minimal for housing wealth. Heaton and Lucas (1997) argue that people invest in financial assets to protect themselves against income shocks and Hockguertel (2003) finds that people invest more in safe liquid assets if exposed to more uncertainty. Therefore, the main regression will focus on financial wealth, which is more likely to be used for precautionary reasons, whereas the illiquid assets are more likely to be used for retirement purposes.

A closed form solution to the maximization problem in Equation (6) is found by solving the Euler Equation, when time preference equals the discount rate and time separability of utility holds.

$$\frac{\partial u(c_t)}{\partial c_t} = \mathrm{E_t}\left[\frac{\partial u(c_{t+1})}{\partial c_{t+1}}\right] \tag{7}$$

By backward recursion of Equation (6), Mastrogiacomo and Alessie (2014) found the following solution to the optimal level of assets A_{it};

$$A_{it} = \sum_{\tau=1}^{t}[y_{i\tau} - Y_{i\tau}] + t\left(\frac{t+1}{2} - T\right) * \ln(1/(1+\rho)) + \sum_{\tau=1}^{t} \frac{\theta\sigma_i^2}{2(T-t+1)} * \sum_{\iota=1}^{T-\tau} \frac{(1-\lambda^{\iota})^2}{(1-\lambda^{\iota})^2 \iota} \tag{8}$$

Where $y_{i\tau}$ is labour income in period τ, ρ is the time preference, Θ absolute risk aversion, λ the persistence of the income shocks, σ^2 the income variance and $Y_{i\tau}$ is permanent income. The last term is defined as follows by Mastrogiacomo and Alessie (2014);

$$Y_{it} = (T - t + 1)^{-1} * (A_{it-1} + \sum_{\tau=1}^{T} E_{it} y_{i\tau}) \tag{9}$$

$with\ A_{it-1}$ representing the assets of the previous year and $E_{it}y_{i\tau}$ are the expectations at time t of all future income. It is assumed that at time *t* the expectations for all future income streams are equivalent to the expected income of the next year. These expectations can be altered each period.

In this paper, the definition of permanent income is modified, since Equation (9) yields multiple negative or economically infeasibly low values of permanent income. Similar to Guiso et al. (1992), the term 'permanent earnings' is used to emphasizing the focus on the earnings uncertainty of the labour force, regardless of their working status. Guiso et al. (1992) assumed dynamic income levels, which depend on an individual's characteristics, such as age and education. This paper simplifies the model of Guiso et al. (1992), constructing permanent earnings (Y_{it}) as a function of recent net income and the number of future labour earnings that left, which depends on age;

$$Y_{it} = (y_{it} + (65 - Age_{it}) * (E_{it}[y_{it+1}]))/(66 - Age_{it}) \tag{10}$$

With y_{it} being household net income, and $E_{it}[y_{it+1}]$ representing next year's expected household net income, which is assumed to be the expected income level for all future periods.

Without uncertainty or prudence, one consumes permanent income every year, and the difference between current income and permanent income determines the level of assets/ liabilities. This is portrayed by the first term in Equation (8) and together with the second term, which represents impatience, the optimal solution without prudence and uncertainty would be obtained. The third term depicts the precautionary motive, which increases assets. When uncertainty, risk aversion or persistence of the shocks increases, precautionary savings increase.

An effect that is solely found in a model with finite time is the dependency on age. For those who have already built up many assets and only have a small period of exposure to income risk remaining, exhibition of precautionary behavior is less likely. A younger individual, who still has an extended period of income risk exposure and has not accumulated many assets yet, is more likely to exhibit precautionary behavior. In infinite time models one faces uncertainty for an infinite period of time, diminishing the influence of age.

The model considered by both Guiso et al. (1992) and Mastrogiacomo and Alessie (2014) models the level of assets as follows;

$$\ln \frac{A_{it}}{Y_i} = \beta_0 + \beta_1 \ln(Y_i) + \beta_2 \frac{\sigma^2_{yit}}{Y_i} + \beta_3 x_{it} + u_{it} \tag{11}$$

The dependent variable is the log of assets divided by permanent earnings. The right-hand side contains the log of permanent earnings $\ln(\mathrm{Y_i})$, the conditional variance of income variance divided by permanent earnings $(\sigma_{\mathrm{it}}^2/\mathrm{Y_i})$, a vector of controls x_{it} and the error term $\mathrm{u_{it}}$.

The model in this paper is based on Equation (11), yet with the extension that the income variance is dependent on the time-period. *D* denotes the dummy for either pre-crisis period or post-crisis period and *Θ* is the dummy for being risk averse.

$$\ln\frac{\mathrm{A_{it}}}{\mathrm{Y_i}} = \beta_0 + \beta_1 \ln(\mathrm{Y_i}) + \beta_2 \mathrm{D_{crisis}} \frac{\sigma_{\mathrm{it}}^2}{\mathrm{Y_i}} + \beta_3 D_{crisis} + \beta_4 \theta_{\mathrm{it}} + \beta_5 \mathrm{x_{it}} + \mathrm{u_{it}} \quad (12)$$

4. Data

In this paper use is made of data of the DNB Household Survey administered by CentERdata (Tilburg University, The Netherlands). The survey is annually distributed amongst a representative sample of the Dutch population since 1993. For this study, the waves of the year 2004[2] till 2017 are used, in which information on the previous and current year is asked. The Great Recession started at the end of 2007 and ended in 2008. For Europe, this was followed by the Solvency Crisis until 2010 and followed up by the European Debt Crisis until and including 2013. During the third quarter of 2015, the CBS[3] concluded that the Netherlands had overcome the crisis with growth in many domestic sectors compared to the previous year. Therefore, 2015 has been assumed to be the first year of post-crisis. This results in four years of pre-crisis, seven years of economic downturn, and two years of post-crisis. The 7-year period will be referred to as the ‘crisis period’.

During this period, information on 60,855 individuals was gathered, of which 25,379 were the heads of the household. Annually, between 1,600 and 2,300 households responded to the survey. Unfortunately, not all respondents have filled out the annual survey satisfactory, hence a large amount of observations had to be dropped for which relevant information is unknown. One cause of missing information is the distribution of the sub-questionnaire during different periods of the year. Missing data on gender and birthyear could be reconstructed when this information was provided consistently in another year. For education, missing values could be filled up when the highest obtained education of the year before and after is known, and those levels were identical.

Due to non-response, addition of new households and inconsistency of relevant questions, the unbalanced panel data set is reduced to 3,097.[4] Annually, between 200 and 300 households can be used for the analysis. This sample includes 1,034 unique households which remain 4.6 years in the sample on average, with a maximum of 14 appearances. The paper uses four sample sizes; the main sample, a second sample with alternative measure of income risk;

[2] Data of 2003 used to calculate lags for 2004.
[3] https://www.rtlz.nl/algemeen/economie/cbs-crisis-lijkt-achter-ons
[4] Deviating values regarding; expected income changes, net income, net worth, financial wealth or the ranges for next year’s income and resulted in 26 exclusions.

one with the additional controls; and the fourth with both additional controls and the alternative uncertainty measure.[5] The three other samples are smaller in size; respectively containing 3,014, 1,794, and 1,717 observations.

4.1 Variable construction

Assets

Like Mastrogiacomo and Alessie (2014), who make use of different waves of the DHS data set, net worth is calculated as the addition of all assets and subtraction of liabilities. For financial worth, mortgages, real-estate, and other illiquid assets such as boats were not included. Unfortunately, the survey does not ask for each item which member(s) of the household is/are the owner(s), only for deposits, checking-accounts, and savings the survey provides this information. Arrears, mortgages, and real estate are assumed to be owned by all members of the household, who are assumed to be equally responsible for housing assets. For other items, it was assumed that they were individually owned, unless the household members provided the same value. Furthermore, if the exact level of assets or liabilities is not known by the respondents, they are offered value ranges in which they can scale their assets/ liability. The midpoint of this range is used in that case. Some questions on assets have been adjusted, added or deleted. An overview of the construction and adjustments can be found in *Appendix A*.

Permanent Earnings & head of household

Equation (10) defines the value of permanent earnings, which is defined as an average of current household net income and the expectations of the head of the household of next year's net income. Section 4.2 elaborates on the expected future income level. The head of household has been determined based upon a question regarding financial decision making within the household. If this question yielded no dominant decider, the person who was registered as head of household was considered as the head of household.

Risk aversion & Crisis Dummies

A respondent is asked to provide a number within a scale of 1-7 to rate how much they agree with the statement, with '1' representing totally disagree and '7' totally agree with a question regarding risk averseness. As the crisis might affect risk, risk aversion is not assumed to be time-invariant, and changes are thus allowed. Most respondents only change their answers remotely, yet each year a small group changes drastically. Table 1 shows that the average change per head did not differ more around the crisis years. When a respondent altered their answer to the risk aversion question with one-point difference compared to the previous year, it does not necessarily mean that risk aversion changes. Out of the 2,502 people of whom a

[5] Reduced size due to missing information or questions not annually occurring

previous risk aversion score is known, 2.005 have changed their score.[6] When a respondent answered with a 5 or higher, they are considered to be risk averse.[7] About one third of the observations changed more than twice from being risk averse to not risk averse or vice versa

The year attributed to observations is the year preceding the year of the distribution of the survey. Respondents are asked to provide information on the value of their assets as of the last day of the preceding year, yet also on current states like risk aversion or mortgages. This yields a slight mismatch of data. This problem is not deemed to be of major influence however. Especially, since the different surveys have been distributed during different periods of the year, a perfect adjustment is not possible.

*Table 1. Development of average changes in risk aversion (*ΔRA) score*, scale 1-7*

YEAR	04	05	06	07	08	09	10	11	12	13	14	15	16
ΔRA	-0.07	-0.10	-0.07	0.17	-0.16	0.09	-0.03	0.23	-0.17	-0.10	-0.09	0.14	-0.26
(SD)	(1.65)	(1.63)	(1.56)	(1.67)	(1.81)	(1.62)	(1.34)	(1.63)	(1.55)	(1.57)	(1.61)	(1.37)	(1.62)
[RANGE]	[-6,6]	[-6,6]	[-6,4]	[-6,6]	[-6,6]	[-6,6]	[-4,5]	[-6,6]	[-6,4]	[-6,6]	[-6,5]	[-3,6]	[-6,6]
N	215	186	219	207	191	172	184	185	173	210	207	166	187

Control variables

Similar controls to Mastrogiacomo and Alessie (2014) are used, which include *Age*, *Age*^{2}, *Age*^{3}, *Family Size, and Children.* The controls Mastrogiacomo and Alessie (2014) included in extended models, *Cohort*, *Time*, *Self-employment*, *Motive for precautionary savings* and *Public Sector* are added in the main regression of this paper. The inclusion of relevant controls is crucial to yield unbiased results. Following the approach of Broadway and Halsken, (2017) who included cognitive controls, additional models will be estimated, which contain controls deemed of importance for the level of household savings. These are *'Stock invested'*, '*Financial Literate*' and *'Ever fired within Household'.*

After the crisis, one could see that also bonds were not riskless, as for example the governments of Greece and Ireland faced challenging times during the Solvency Crisis and the European Debt Crisis.[8] Therefore, all investments that bore exposed to the market could have suffered from the crisis and treated equally as market investments. Being exposed to market risk would increase precautionary savings, however, those who invest in stocks are generally less risk averse and wealthier which would indicate they are less prone to behave precautionary.

Being financially constrained could explain why the poor in Mexico, who had no health insurance, did not save precautionary for possible health expenditures. (Naranjo and Van

[6] Only one term gained significance at 10% when the risk aversion scale was used instead of the dummy
[7] A score of 4 was considered as indifferent, a score of 5 implies agreeing with the statement
[8] https://www.nytimes.com/interactive/2016/business/international/greece-debt-crisis-euro.html

Gameren, 2016). Following Collins (2012), financial advice cannot substitute financial literacy, it can only complement financial literacy. If one is less financially educated, one is less able to make optimal financial decisions, resulting in insufficient self-insurance.

An effect of the crisis was the increase in unemployment.[9] Therefore, a variable is constructed to see whether one of the two spouses has been fired until that point in time, based on working status. When one faced an income shock, resources had to be depleted and might be more prone to future precautionary savings (Broadway and Halsken, 2017).

Cohorts are constructed per decade, starting with cohort1, which includes those born between 1985 - 1994. Someone born in 1994 would be legally responsible for their own finances in the Netherlands in 2017, which is the year of the last collection of data. Six cohorts are constructed in total. The oldest cohort drops out of the sample when the crisis starts. Older cohorts are assumed to have retired in this model, thus cannot provide any data on their earnings variance.

Motivation to save for unexpected expenses is used as control variable as the crisis could affect one's opinion on precautionary savings. The bequest motive which Mastrogiacomo and Alessie (2014) included has been deterred from the model. Rossi and Sansone (2017) studied the effect of uncertainty on the level of bequest levels in Italy in the period of 2004-2012 and found no effect. See appendix A for further information on the construction of variables.

Ideally, expected real income changes should be considered, as opposed to nominal changes used in this paper. The survey asks individuals to present their expectations on price changes, yet the phrasing of the question regarding the inflation has been changed. Up and until including 2007, one could provide any expected inflation rate, similarly to the question regarding expectations on income. From 2008 onwards, the survey asks respondents how likely they think it is that prices change within the range of [0% - 15%]. Answers to the initial question regarding inflation yielded answers exceeding both limits provided by the latter question, yet the biggest objection against using both data sets is a bias of getting predetermined inflation rates or having to determine yourself. This would lead to a bias. Additionally, inflation rates have been historically low during this period, with an average of 1.65%.[10] Similar to Mastrogiacomo and Alessie (2014), the inflation rate has not been accounted for.

4.2 Earnings Variance

Subjective earnings variance is based upon the survey question asking respondents to provide the highest and lowest expected income level on the household level for upcoming year. The variable of earnings variance was based upon the following question until 2008:

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[9] https://www.volkskrant.nl/economie/werkloosheid-daalt-maar-is-nog-altijd-hoger-dan-voor-crisis-vooral-mannen-vinden-moeilijk-baan~b592378e/

[10] http://nl.inflation.eu/inflatiecijfers/nederland/historische-inflatie/cpi-inflatie-nederland.aspx

"We would like to know a little bit more about what you expect will happen to the net income of your household in the next 12 months. What do you expect to be the LOWEST ***total net monthly income*** *your household may realize in the next 12 months? (=LAAG)… What do you expect to be the HIGHEST* ***total net income*** *your household may realize in the next 12 months?(=HOOG)"*
"Below, we will show you a number of amount that could theoretically be the total net income of your household. Please indicate with each amount what you think is the probability [..] that the total net income of your household will be LESS than this amount in the next 12 months."
"What do you think is the probability that the total net income of your household will be less than €[LAAG+((HOOG-LAAG)({2,4,6,8}))/10] in the next 12 months?"*

The above stated question is not clear, the first sub-question asks for monthly income and the second sub-question for annual income. After 2008, the question was rephrased as follows:

'What do you expect to be the LOWEST ***total net yearly income*** *your household may realize in the next 12 months?'*

The average expected income, assuming annual incomes were provided, was €18,976 before 2008 and €35,284 after. Equation (16) elaborates on the construction of expected income. Based upon visual judgement (*Appendix C*) the difference between before and after the rephrasing of the question is also clear.[11] There is a range in which hardly any values are situated around €5,000.-. Expected incomes below €5,000.- before 2008 were assumed to be monthly income estimations and these incomes have been multiplied by 12. An annual income of €5,000.- is very low, especially considering that the gross minimum wage is around €1,500.- per month[12]. One cannot presume all respondents filled out monthly data in preceding years, due to part-time work for example. Yet, for those who have been assumed to have provided monthly data before 2008 and still provide income levels below €5,000.-, the assumption is made these respondents repeatedly filled out the questionnaire wrong.[13] Those who had an expected income lower than €100, which was simultaneously lower than last year's income divided by 12 were dropped.

If a respondent thinks it will earn at least €100 (*LAAG/income00*) and a maximum of €200 (*HOOG/income100),* they are asked to provide the probability of earning at least €120 (*income20*), €140 (*income40*), €160 (*income60*) and €180 (*income80*). The probabilities of earning these incomes are denoted as *pro1, pro2, pro3,* and *pro4* respectively. The probability

[11] Of all observations with expected lower income than €10,000.-, 80% was in the period of 2004-2007.
[12] Gross minimum in 2010; https://www.plusonline.nl/werken/uitkeringen-per-1-januari-2010
[13] These changes have been made for 808 individuals before 2008 and 66 from 2008 onwards (Main sample)

of earning at least *income00*, is equal to zero. The chance on one specific value on a continuous scale is zero. The probability of earning at least *income100* is equal to 100%.

To be consistent, the probabilities should satisfy the following conditions; The probabilities cannot descent to sustain increasing monotonicity; *pro1* has to exceed 0, otherwise income00 is not the lowest expected income; *pro1*-*pro4* cannot be 100%, otherwise *income100* cannot be obtained. Two alternate answer strategies were found under the respondents for which the answers are still valid.

- When the increasing monotonicity assumption was violated, one could have also answered the question by focusing on the smaller income ranges separately instead of the whole area on the left of the suggested income level. They focus on the 20% income ranges instead of adding the probabilities e.g. provide the probability of earning between €100-€120 and €120-€140 instead of between €100-€120 and €100-€140.

  If the total sum of separate probabilities attained a maximum of 99%, this alternative approach is used.
- When strictly descending probabilities were provided, which also exceeded 99% if added, they were assumed to have switched the distribution around. If the first probability is 90% and the second 80%, it is assumed that the respondent believes that there is a 90% probability that he or she will earn at least €120 and a probability of 80% of earning at least €140. These answers have been altered by proposing that being 90% sure of earning at least this amount is equal to being 10% sure that €120 is the maximum and thus earning at least €120.[14]

Due to inconsistency under all three methods, 719 observations had to be dropped. Dominitz and Manski (1997) studied the strength of this measure with "*LAAG*", "*HOOG*" questions for income uncertainty and found that it was a feasible and useful measure of income expectations, yet to be used with caution of incoherent answers.

Earnings variance has been calculated by following the approach of Mastrogiacomo and Alessie (2014). The respondents in their dataset were asked to rate how likely they deem relative income changes within a range of [-15%,+15%]. To calculate these relative income changes ($\Delta\varsigma$)for the sample in this paper, this year's net income (y_{it}) is subtracted from the five possible income levels based upon the question stated above. These expected income values ($income\varsigma 0$) are set at the midpoint of the lower bound and the upper bound of each 20% range. The difference of the net income and expected income value is divided by net income (y_{it}), see Equation (14). Calculating the total expected income change is done by multiplying the expected percentage change by the probabilities of obtaining these expected income values. To obtain these percentages, the probabilities were cut into smaller pieces, similar to the first alternative answer strategy. By subtracting the probability of earning 20% more from the initial

[14] The probability of earning a precise amount on a continues scale is zero.

value, the probability of earning the expected income value is calculated ($pro20/40/60/80/100$). Equation (13) illustrates the construction of the expected total income change. The variance of the income change, σ^2, is computed with the help of the standard formula of variance in Equation (15).

$$E[\%\Delta y_{it}] = \sum pro\iota * E[\Delta\varsigma] \qquad \text{for } \iota = 20,40,60,80,100 \;\&\; \varsigma=1,2,3,4,5 \tag{13}$$

$$E[\Delta\varsigma] = (income\varsigma 0 - y_{it})/y_{it} \text{ ,where } \varsigma=1,2,3,4 \text{ or } 5 \tag{14}$$

$$\sigma^2 = \sum \mathrm{pro\iota 0} * (E[\Delta\varsigma] - \mathrm{E[\%\Delta yit]})^2$$
$$\text{for } \iota = 2,4,6,8,10 \;\&\; \varsigma = 0,2,4,6,8 \tag{15}$$

To find the conditional variance (σ_y^2), one needs to multiply the variance with the square of current income, $\sigma^2 * y_{it}^2$. The measure of conditional variance divided by permanent earnings (σ^2_{yit}/Y_{it}) is the initial estimate of earnings variance within this paper.

Expected income for the next period is calculate by multiplying the expected income values ($income\varsigma 0$) with the probability of net income being situated within that income range(proι0);

$$E[y_{t+1}] = \sum \mathrm{pro\iota 0} * income\varsigma 0 \qquad \text{for } \iota = 20,40,60,80,100 \;\&\; \varsigma=1,2,3,4,5 \tag{16}$$

Whereas to Mastrogiacomo and Alessie (2014) found a mean ratio of the standard deviation of future income to current income (σ_{yit}/y_{it}) of 3%, this paper finds 9.43%. The individuals in this sample have slight pessimistic expectations for their future income. The average increase in earnings is 36.86%, with an expected earnings variance of 4.46%. When the 118 individuals who believe their income exceeds this year's at least with 100% are ignored, the average income change is -2.5%. The value of (σ_y/y_{it}) drops to 7.04%, which is still quite high compared to Mastrogiacomo and Alessie (2014). When the observations of which the minimum or maximum expected change in income exceeded [-15%-15%], which are the ranges the respondents faced in the data of Mastrogiacomo and Alessie (2014), 1,887 observations are left, who have an expected income change of 0.06% with (σ_{yit}/y_{it}) dropping to 5.55%. The average expected income for next year is €33,886 compared to the average income of €36,335 of the previous year. The questions regarding income expectations follow shortly after the questions regarding current net income, which increases the likelihood of proper expectations.

4.2.1 Variance unemployment risk

As Kennickell and Lusardi (2004) argued, the shortcoming of the approach above is the inability of one year ahead income variance to capture lifetime income risks. Mastrogiacomo and Alessie (2014) use length of entitlement to unemployment benefits as instrument for income risk. Since Dutch employment contracts specify predetermined wages, the main uncertainty for workers is being fired. This paper uses the subjective probability of being without a job next year as alternative measurement of earnings variance. Those who were employed had to answer the first question, those who are unemployed but looking the second;

"What do you think is the probability that you lose your job in the next 12 months?"
"What do you think is the probability that you find a job in the next 12 months?"

For those who were not currently employed but were searching for a job, the probability of being without a job (p_{JL}) in the next period is determined by subtracting the chance of getting a job from 100%.

Respondents who are certain they will lose their job next year face lower expected income, however face no uncertainty. Therefore, the variance of the chance of being unemployed next year must be estimated. For binomial distributions, this is done by using Equation (17);

$$\text{var}(p_{JL}) = 1 * \ (1 - p_{JL}) \tag{17}$$

Mastrogiacomo and Alessie (2014) have shown that the uncertainty of the spouse is of importance as well. The relevant question only had to be answered by those working or looking for a job, e.g. the working population. Most spouses were voluntary not working, thus the chance of an income shock through them is zero. The alternative measure of earnings risk is estimated as the variance of the chance of at least one of both spouses having zero income out of labour next year. The chance of at least one household member being jobless *(p_{JLHH})* is estimated by Equation (18), in which p_{JLH} is the head's subjective probability of being without a job next year and p_{JHS} is the equivalent for the spouse.[15] The corresponding variance, *var(p_{JLHH}),* is calculated similar to Equation (17).

$$p_{JLHH} \ = \ [1 - (1 - p_{JLH}) * (1 - p_{JLS})] \tag{18}$$

[15] Assuming zero correlation between both events.

4.3 Summary statistics

Table 2. Summary statistics of different sample sizes (€), Mean (SD)

Variable	Sample 1 N=3,097	Sample 2 N= 3,012	Sample 3 N=1,794	Sample 4 N= 1,717
Age(H)	46.64 (10.84)	46.51 (10.77)	46.83 (10.60)	46.60 (10.49)
Cohort(H)	3.51 (1.21)	3.48 (1.19)	3.60 (1.19)	3.56 (1.16)
Education(H)				
Primary	1.07%(10.26%)	0.93%(9.60%)	1.17%(10.76%)	0.93%(9.61%)
Highschool	26.74%(44.27%)	26.16%(43.96%)	27.87%(44.85%)	26.97%(44.39%)
Voc. -training	20.67%(40.50%)	20.68%(40.51%)	20.40%(40.31%)	20.33%(40.25%)
Vocational	29.64%(45.68%)	30.01%(45.84%)	29.32%(45.54%)	29.99%(45.84%)
University	20.92%(40.68%)	21.31%(40.96%)	20.12%(40.10%)	20.73%(39.58%)
No education	0.00%(0.00%)	0.00%(0.00%)	0.00%(0.00%)	0.00%(0.00%)
Other educ.	0.97%(9.80%)	0.90%(9.43%)	1.11%(10.50%)	1.05%(10.19%)
Man(H)	70.81% (45.46%)	71.15% (45.31%)	72.21% (44.88%)	72.57% (44.63%)
Working	84.89% (35.82%)	86.39% (34.30%)	85.34% (35.38%)	87.89% (32.64%)
Self-employed (H)	11.43% (31.82%)	11.45% (31.85%)	11.32% (31.69%)	11.30% (31.67%)
Risk Aversion(H)	5.10 (1.61)	5.11 (1.61)	5.07 (1.61)	5.08 (1.60)
Public Sector	14.16% (34.87%)	14.01% (34.72%)	14.45% (35.17%)	14.50% (35.22%)
Family size(HH)	2.54 (1.36)	2.54 (1.36)	2.59 (1.36)	2.60 (1.37)
Children(HH)	0.82 (1.11)	0.83 (1.11)	0.86 (1.13)	0.87 (1.13)
Net income (HH)	36,635.40 (22,120.07)	36,866.30 (22,122.14)	36,378.15 (22,534.01)	36,715.96 (22,212.03)
Net worth(HH)	138,165.80 (190,357.30)	136,492.70 (185,411.90)	145,510.60 (200,563.60)	142,717.80 (192,578.90)
Fin. Wealth(HH)	23,861.57 (62,888.44)	23,630.15 (62,452.76)	24,494.75 (63,524.92)	24,087.20 (62,679.44)
Y_{it} (H)	34,111.78 (16,825.09)	34,412.08 (16,872.55)	33,504.95 (16,332.60)	33,960.40 (16,406.24)
σ^2_{yit} / Y_{it}	366.67 (1,216.83)		356.71 (1,152.97)	
var(P_{JLHH})		*0.08801* *(0.09252)*		*0.08802* *(0.09257)*

HH= Household level, H = Head of household. Percentages are percentage points.

This paper makes use of multiple samples, the characteristics of these different samples can be as found in Table 2. The samples have comparable decompositions. The largest difference can be found in net worth, which is higher for the samples without the interaction variables compared to the samples with the controls. Financial wealth does not seem to differ much between the samples. Net wealth was negative for 13% of sample 1, whereas financial wealth was negative for 19% of these households, however.

Table 3. Summary statistics regarding wealth (€), Mean (SD) on household level, per period

Variable	Pre-crisis N= 1,000	During crisis N= 1,631	Post-crisis N= 466
Risk Averse(H)	0.70	0.72	0.69
	(0.46)	(0.45)	(0.46)
Total Assets	228,347.40	227,927.90	223,155.50
	(248,374.10)	(193,387.40)	(185,374.60)
Total Cur. Assets	28,013.05	29,773.75	26,547.31
	(59,408.23)	(59,369.26)	(50,594.34)
Total Debt	75,100.84	93,074.83	105,757.30
	(101,221.80)	(121,474.80)	(128,316.70)
Total Cur. Debt	3,727.17	5,212.60	6,044.84
	(26,734.11)	(20,222.83)	(22,569.30)
Financial Wealth	24,285.88	24,561.16	20,502.47
	(64,837.92)	(63,547.08)	(55,961.54)
Net Worth	153,246.60	134,853.10	117,398.20
	(228,856.80)	(172,502.20)	(153,195.50)
Y_{it}	29,810.79	35,641.97	37,985.71
	(13,416.20)	(17,626.91)	(18,598.65)
$LN(A_{it}/Y_{it})$ [16]	0.51	0.45	0.35
	(0.75)	(0.82)	(0.82)

H= Head of household.

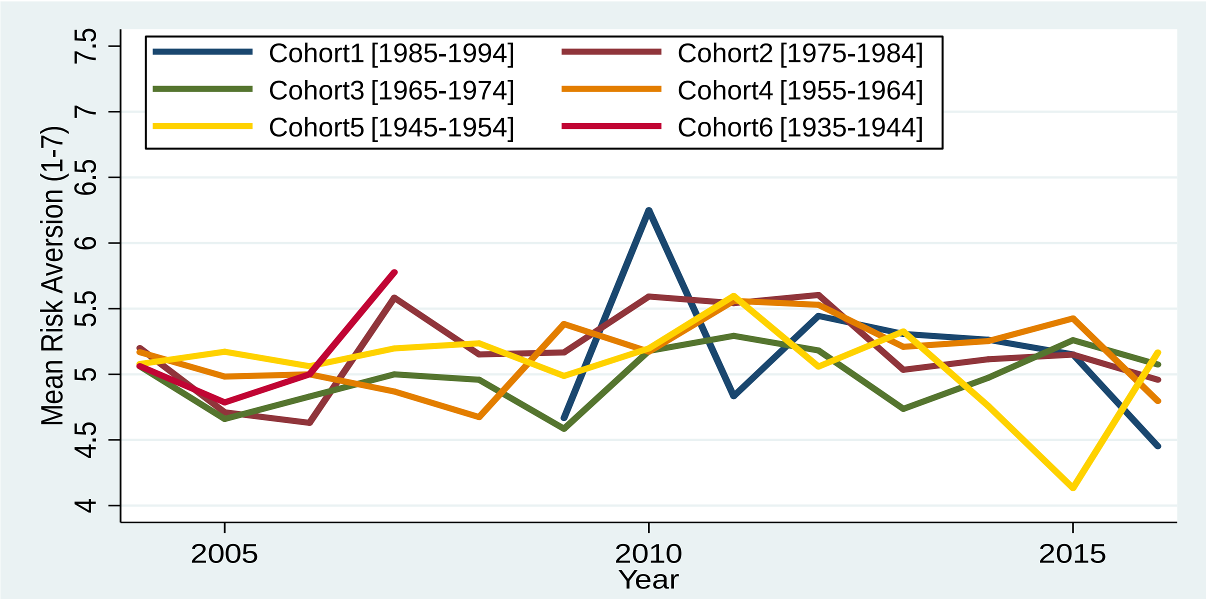
Table 3 illustrates the share of risk averse individuals and the variables which influence wealth accumulation in the three periods. Total assets slightly decreased during the crisis and decreased more pronounced in the period afterwards. Current assets increased slightly during the crisis and showed a drop after the crisis as well. Both total debt and current debt increased substantially as time progressed. This resulted in a slight increase of financial wealth during the crisis and drop in the post-crisis period. Net worth dropped sharp both during and after the crisis. Since debt levels have risen over time, changes in savings are not likely to be a result of credit restrictions-effects during the crisis. The log of financial wealth over permanent earnings is decreasing over time. Whereas financial wealth did not decline during the crisis, permanent earnings did increase sharply during the crisis, and increased gradually after the crisis. This

[16] Financial wealth. To be able to include households with negative net worth or financial wealth, the inverse sine transformation has been applied, similarly to Mastrogiacomo and Alessie (2014) . [*log(x+sqrt(1+x²))*]

rapid increase could be the result of the vague question regarding monthly/ annual income expectations.

The amount of people who were risk averse rose during the crisis and decreased again after the crisis, a trend which is supported by Figure 1. Around 2008, risk aversion levels rose for all cohorts except cohort4. Cohorts diverged until roughly 2013 after which risk aversion dropped to levels comparable to pre-crisis levels. Only cohort5, the oldest cohort at this point of time, diverged from the other cohort with a drop in 2015. For cohort1, only one respondent filled out the risk aversion question before 2009, hence this observation has been excluded from the graph.

Figure 1. Development risk aversion per cohort, scale 1-7



Figures 2 and 3 illustrate the development of financial wealth and net worth over time for different cohorts. The median is displayed to diminish the influence of relative wealthy or poor households.[17] Financial wealth is very volatile, with an upward trend. There does not seem to be a distinct difference between cohorts. For net worth, deviation between cohorts is visible. Cohort2 portrays low levels of assets, whereas cohort4 starts off relatively wealthy, but in 2016 is not doing well relatively to the older cohorts. The crisis could affect the different cohorts during different ages. Therefore Table 4 portrays the average ages of the different cohorts during the start and end of the crisis period to see the influence of the economic downturn.

[17] Appendix (C) displays the mean values

Figure 2. Median financial wealth development per cohort with age.

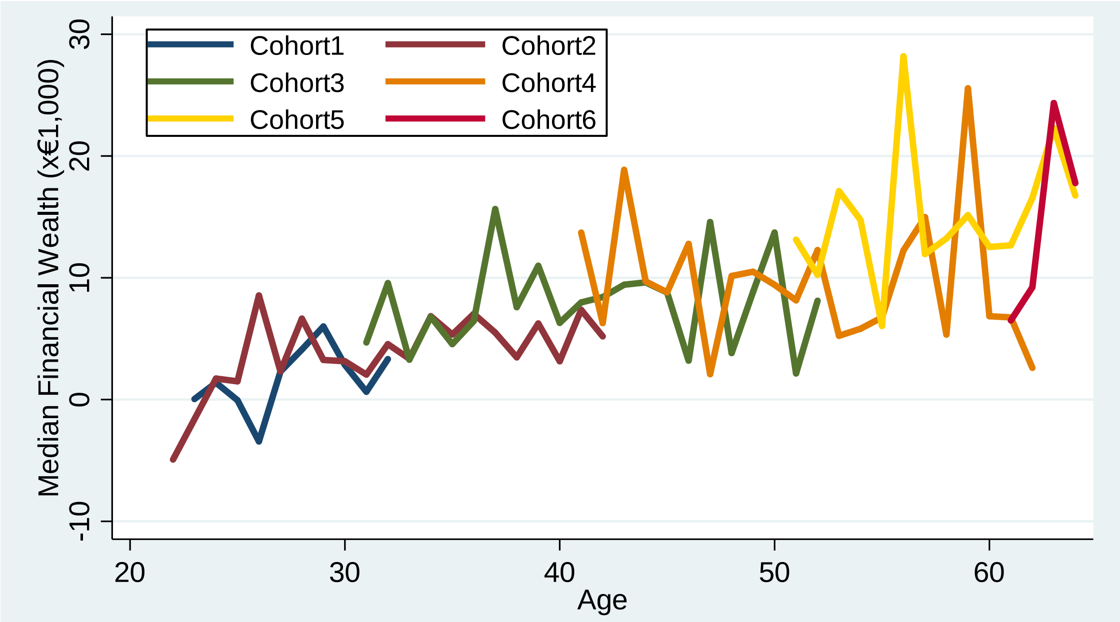


Table 4. Mean age for each cohort during breakpoints.

COHORT	1	2	3	4	5	6
BIRTHYEAR	1987	1978	1970	1960	1951	1943
AGE IN '08	21	30	38	48	57	65
AGE IN '15	28	37	45	55	64	x
N	132	593	782	792	751	47

Figure 3. Median net worth development per cohort with age

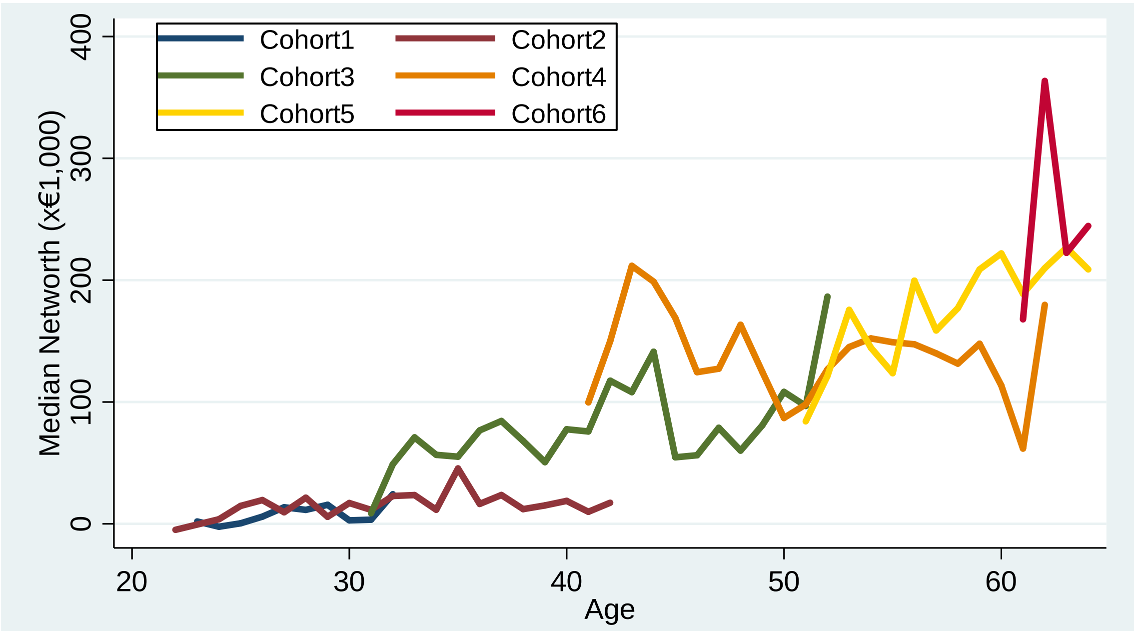


Figure 2 illustrates cohort2 obtaining more stability during the crisis. Cohort3 and cohort4 face a fall in wealth around the start and experience a rather volatile path after the crisis. Cohort5 and cohort6 face a fall in wealth around the start of the crisis as well.

Cohort1, cohort2, and cohort5 show no outspoken response to the crisis in Figure 3. Cohort3's worth increases around the start of the crisis and drops when it ends. Cohort4 and cohort6 face a drop in net worth around the start, and cohort4 endures another drop in worth when the crisis ends. The two youngest cohorts illustrate lower levels of net worth. These cohorts benefited least from the economic boom before the crisis and are thus less equipped against the economic downturn. The figures show no other pronounced effects of the crisis.

Table 5. Expectations and values in pre-, post-, and during crisis period (Sample 2)

Variable	Pre-crisis N= 921	During crisis N= 1,626	Post-crisis N= 465
σ_{yit} / y_{it}	9.60%	9.73%	8.54%
	(16.99%)	(21.73%)	(11.68%)
σ^2_{it}	3.80%	5.67%	2.09%
	(22.13%)	(4371%)	(8.98%)
P(No job t+1) H	14.09%	17.40%	16.83%
	(21.01%)	(22.48%)	(23.67%)
P(Jobless t+1) HH	15.90%	18.67%	17.88%
	(22.56%)	(24.46%)	(25.10%)
Var(P_{JLHH})	8.29%	9.21%	8.40%
	(8.92%)	(9.47%)	(9.07%)
$E_{it}[y_{t+1}]$ HH	30,143.29	35,403.36	37,990.43
	(13,747.70)	(18,047.90)	(19,034.66)
Y_{it}	30,349.43	35,675.14	38,042.11
	(13,496.24)	(17,637.76)	(18,578.76)
y_{it}	33,628.49	37,832.48	39,900.73
	(19,742.41)	(23,416.95)	(21,194.88)
Motivation Prec. Saving	5.760	5.825	5.211
(Scale 1-7)	(1.085)	(1.097)	(1.445)
Household Savings (€)	11,682.62	16,345.30	16,063.09
	(25,676.03)	(29,971.04)	(29,038.32)
Savings NL [18] (€mln)	202,246.67	301,342.86	338,646.50
	N=896	N=1,550	N=409
Fired within HH*	18.86%	32.58%	33.74%
	(39.14%)	(46.88%)	(47.34%)
Ever fired HH*	25.22%	41.23%	44.01%
	(43.45%)	(49.24%)	(49.70%)

HH= Household level, H = Head. * Smaller sample size due to missing data

Broadway and Halsken (2017) concluded that subjective income was too high during the crisis. Table 5 illustrates the development of the main drivers of precautionary savings during the three periods. Subjective income variance increased during the crisis from 3.8% to

[18] CBS - https://opendata.cbs.nl/statline/#/CBS/nl/dataset/7116shfo/table?ts=1525355690809

5.7% and dropped to 2.1% in the post-crisis period. The standard deviation of net income is an objective measure of income variance, and this increased during the crisis and dropped in the post-crisis period. The subjective earnings variance moves along with the objective. The head's perceived probability of being unemployed next year increases in the crisis period to 17.4% for the head and drops in the period after the crisis to 16.8%. The probability of either spouse being unemployed next year corresponds, yet with slightly elevated percentages. The variance of the probability of being jobless increased during the crisis from 8.3% to 9.2% and decreased to 8.4% in the post-crisis period. Entering the crisis brought along both an increase in the subjective unemployment variance and an increase of households who had a member lose its job. After the crisis the subjective risk of unemployment decreased, however the number of households in which a member lost its job increased slightly. Both proxies of income uncertainty did rise during the crisis and dropped again afterwards. Expected future income $(E_{it}[y_{t+1}])$ was substantially lower before the crisis and increased with respect to the crisis period in the post-crisis period. Actual income (y_{it}) rose with time as well, resulting in an increase of permanent earnings (Y_{it}). The respondent's motivation for precautionary savings increases a bit during the crisis, but drops again in the post-crisis period. The level of savings increases during the crisis, which is found in national data as well. Yet whereas domestic levels increase also after the crisis, this sample shows a slight decrease. In the three periods, around 52% of the respondents expected next year's income to exceed this year's net income.

5. Empirical Results

The White test and Durbin Watson test find proof for the presence of heteroskedasticity and autocorrelation in the data. Guiso et al. (1992) acknowledged possible heteroskedasticity problems and attempted to diminish the problem by dividing the variables by permanent earnings. This does not solve the problem in this paper and similarly to Guiso et al. (1992) White standard errors are applied. These error terms adjust for the positive autocorrelation as well.

Pooled OLS

Similar to Mastrogiacomo and Alessie (2014), Guiso et al. (1992), and Broadway and Halsken (2017) who use subjective earnings variance, the first regressions are based on pooled OLS (POLS) models. POLS corrects for within-group different standard errors. The coefficients are determined similar to cross-sectional data set. For comparability reasons, the POLS model of Mastrogiacomo and Alessie (2014) is estimated. Their results are quite different compared to this paper. Their coefficient of subjective earnings variance, b_2, is significant at a 1% level, which translates in a precautionary savings rate of 4% of net worth. The identical regression in this paper yields an insignificant coefficient. The precautionary motive remains insignificant when financial wealth instead of net wealth is used.

Table 6. Regression outputs. Dependent var.: $LN(A_{it}/Y_{it})$, POLS, White errors. Proxy: σ^2_{yit}/Y_{it}

VARIABLES	(1) °	(2)	(3)	(4)	(5)
$LN(Y_{it})$	-0.142	0.0385	0.0585	0.0463	-0.0556
	(0.0895)	(0.0571)	(0.0588)	(0.0586)	(0.0700)
σ^2_{yit}/Y_{it}	-3.02e-05	3.17e-06	9.03e-06	6.47e-06	2.26e-05
	(2.00e-05)	(1.13e-05)	(1.74e-05)	(1.76e-05)	(2.45e-05)
σ^2_{yit}/Y_{it} *Pre			-2.40e-05	-2.33e-05	-2.33e-05
			(2.10e-05)	(2.15e-05)	(3.03e-05)
σ^2_{yit}/Y_{it} *Post			8.38e-06	8.14e-06	2.12e-06
			(2.89e-05)	(2.86e-05)	(4.58e-05)
Θ_{it}				0.0961**	0.109**
				(0.0409)	(0.0452)
Pre-crisis			0.128***	0.0815	0.0916
			(0.0374)	(0.0507)	(0.0609)
Post-crisis			-0.0635	-0.0156	-0.0622
			(0.0465)	(0.0545)	(0.0645)
Age	0.123	0.192*	0.204**	0.178	0.0726
	(0.160)	(0.101)	(0.100)	(0.115)	(0.132)
Age^2	-0.00133	-0.00367	-0.00395*	-0.00363	-0.000964
	(0.00362)	(0.00230)	(0.00228)	(0.00264)	(0.00297)
$Age^3/10^2$	0.000704	0.00249	0.00270	0.00254	0.000472
	(0.00265)	(0.00169)	(0.00168)	(0.00195)	(0.00216)
Family Size	0.415***	-0.0392	-0.0455	-0.0403	-0.185**
	(0.101)	(0.0559)	(0.0557)	(0.0549)	(0.0720)
Children	-0.326***	-0.0129	-0.00874	-0.00927	0.101
	(0.120)	(0.0690)	(0.0686)	(0.0677)	(0.0828)
Self-employed				0.137*	0.0929
				(0.0704)	(0.0793)
Public-sector				0.157***	0.147**
				(0.0601)	(0.0617)
Cohorts				Yes	Yes
Prec. Motive				0.0133	0.000301
				(0.0151)	(0.0160)
Stock Invested					0.340***
					(0.0576)
Financially Literate					0.152***
					(0.0384)
Fired within HH					-0.0466
					(0.0500)
Financially Struggling					-0.210***
					(0.0466)
Constant	-1.322	-3.296**	-3.697**	-3.037*	-0.924
	(2.328)	(1.491)	(1.491)	(1.626)	(1.908)
Observations	3,097	3,097	3,097	3,097	1,794
R-squared	0.166	0.069	0.076	0.088	0.145
AIC	10,192	7,204	7,189	7,167	3,993
Joint significance			-	-	-

Significant at ***1%, **5%, *10%. ° Dependent variable: Net worth instead of financial worth

Model (3) expands the basic model of Mastrogiacomo and Alessie (2014) by including interaction dummies of the different periods with earnings variance over permanent earnings *(σ^2_y/Y_{it})* to capture differences in precautionary savings among the three periods. A Wald test shows that the precautionary savings terms are not jointly significant from zero and thus no conclusions can be based on its coefficients. The same holds for the two other alternative specifications, models (4) and (5). Model (4) includes the controls of Model (3) with additionally a dummy for risk aversion and the additional controls used by Mastrogiacomo and Alessie (2014) (*Self-employment, Public Servant, Cohort Dummies* and *Motivation*). Additionally, Model (5) includes the controls proposed in this paper *(Stock-invested, Financially Literacy, Ever fired within HH,* and *Financially Struggling*). Table 6 provides an overview of the different POLS models. The controls of pre-/post- crisis are significant at a 1% level in Model (3), indicating that the time periods to influence the level of wealth. In models (4) and (5), the crisis dummies are jointly insignificant, yet together with risk aversion significant at a 10% and 5% level respectively. This effect of the crisis and being risk aversion does alter one's financial wealth, but not through precautionary motives. The Akaike Information Criterion (AIC) or Bayesian Information Criterion (BIC) statistic test for explanatory power of a model, but unlike the R^2, 'punish' for including irrelevant variables. The lower the statistic, the more explanatory power a model has. Model (5) yields the AIC store of 3,993, which is a substantial improvement compared to the single lowest statistic of Model (4), 7,167.

Instrumental Variable

Due to measurement errors, endogeneity problems can arise. By including instrumental variables (IV) in the regression, the bias caused by endogeneity can be decreased. Endogeneity arises when variables are correlated to other variables on the right-hand side of the regression. When an IV is endogenous and valid, the endogeneity of a suspicious variable can be tested. For this test, overidentification is required, thus at least one more instrument must be included than variables that are possibly endogenous. Variance of unemployment risk (*$var(P_{JLHH})$),* together with the square of the probability of being unemployed *(p_{JLHH}^2)* will be used as instruments. A respondent's variance of unemployment risk who is 10% certain of unemployment is identical to a respondent's who is 90% certain. Controlling for a relatively high or low chance could influence an individual's perception of risk. Kahneman and Tversky (1979) argue that individuals do not respond in a linear manner to risk, but due to loss aversion they respond more heavily to uncertain losses than gains. Therefore, the square of the probability is included as IV. The correlation between the income variance term σ^2_{yit}/Y_{it} and p_{JHH}^2 is 0.06, and with $var(p_{JLHH})$ is 0.03, which is quite low. The correlation between p_{JHH}^2 and $var(p_{JLHH})$ is 0.315. This would imply that households who assume the chance of losing a job is relatively high, often face higher volatility, e.g. chances relatively close to 50%, compared to those with lower chances.

The Sargan test for exogeneity fails to reject exogeneity of the instruments. The validity of the instruments is tested by regressing (σ^2_y/Y_{it}) on $var(p_{JLHH})$, $(p_{JLHH})^2$, and the other control variables. The two instruments are jointly significant at 1%, implying that at least one of the two terms significantly is influencing income variance. The F-statistics of the two variables is about 5 for all three model specifications. The rule of thumb states that a minimum F-statistic of 10 is required to ensure validity of the instrument. Since validity of the instruments is not undisputed, the results of the test for endogeneity of the instrumented variables need to be interpreted with caution. The endogeneity test[19] fails to reject exogeneity of the variable σ^2_y/Y_{it}, hence there is no need for instrumenting the income variance terms based on this test. The results of the IV regression can be found in Appendix B, however do not yield significant precautionary savings terms. Using only the variance of being unemployed as instrument could lead to biased results due to impossibility to test its exogeneity and its weak validity. The variable $var(p_{JLHH})$ is found to be a weaker instrument on its own.

Fixed Effects

Next to using OLS models and IV instruments to estimate the effect of precautionary savings (see Carroll et al., 2012; Broadway and Halsken, 2017; Mastrogiacomo and Alessie, 2014), some research has adapted fixed effects models when doing research into savings behavior (Mastrogiacomo and Alessie, 2011; Hochguertel, 2003) without using an IV. Since the endogeneity test does not show endogeneity problems, the alternative panel specifications should be considered. Fixed effects (FE) attribute a household specific term to the constant in the regression, whereas the alternative panel estimator, random effects, attributes household specific differences to the error term. This error term cannot be correlated with explanatory variables, whereas the additional term for the constant is allowed to correlate. The Hausman test has been executed to see whether random effects or fixed effects is a better specification, and the test favored FE. Pooled OLS is consistent when unobservable household characteristics that influence the dependent variable are not correlated to one of the explanatory variables.

Whether the FE or POLS specification is appropriate, one needs to test the hypotheses of homogeneous coefficients for all individuals. Pooled OLS accounts for different households, however does not allow for different coefficients. The F-test of these intercepts to be homogenous for each household was rejected when running the FE regression. Pooled OLS estimates provide inefficient results, and thus FE should be used. The White tests illustrate that FE regressions also suffers from heterogeneity; thus robust White errors should be attributed. The disadvantage of FE is that time invariant variables are dropped, resulting in the drop of some cohorts in this model. The financial decision maker can change within a household over time. For 80 households, a change in heads resulted in a change of cohort.

[19] -estat endogenous- in Stata 15

Table 7. Regression outputs. Dependent var.: $LN(A_{it}/Y_{it})$, FE, White errors. Proxy: σ^2_{yit}/Y_{it} .

VARIABLES	(2-FE)	(3-FE)	(4-FE)	(5-FE)
$LN(Y_{it})$	-0.402***	-0.405***	-0.406***	-0.439***
	(0.0464)	(0.0472)	(0.0471)	(0.0704)
σ^2_{yit}/Y_{it}	2.28e-06	1.68e-05	1.72e-05	3.79e-05
	(1.06e-05)	(1.64e-05)	(1.65e-05)	(3.04e-05)
σ^2_{yit}/Y_{it} *Pre		-2.83e-05	-2.88e-05	-4.34e-05
		(1.99e-05)	(1.99e-05)	(3.38e-05)
σ^2_{yit}/Y_{it} *Post		-1.90e-05	-1.92e-05	-9.58e-05**
		(2.69e-05)	(2.64e-05)	(4.34e-05)
θ_{it}			-0.0218	-0.00376
			(0.0274)	(0.0381)
Pre-crisis		0.00979	0.00224	0.0191
		(0.0412)	(0.0426)	(0.0585)
Post-crisis		0.0851*	0.0801*	0.0695
		(0.0442)	(0.0441)	(0.0661)
Age	0.144	0.144	0.183	0.0745
	(0.141)	(0.141)	(0.147)	(0.158)
Age^2	-0.00271	-0.00282	-0.00366	-0.00144
	(0.00303)	(0.00302)	(0.00314)	(0.00344)
$Age^3/10^2$	0.00181	0.00191	0.00248	0.00113
	(0.00212)	(0.00211)	(0.00219)	(0.00243)
Family Size	0.0180	0.0132	0.0122	-0.0964
	(0.0646)	(0.0640)	(0.0632)	(0.142)
Children	0.0599	0.0647	0.0632	0.180
	(0.0934)	(0.0935)	(0.0924)	(0.186)
Self-employed			-0.0213	-0.0379
			(0.0703)	(0.131)
Public-sector			0.0636	-0.00895
			(0.0485)	(0.0856)
Cohort Dummies			Yes	Yes
Precautionary Motive			-0.0162	-0.0265
			(0.0107)	(0.0171)
Stock Invested				0.240***
				(0.0805)
Financially Literate				-0.0749*
				(0.0430)
Fired within HH				-0.0345
				(0.0655)
Financially Struggling				-0.0566
				(0.0427)
Constant	1.869	2.042	1.644	4.238*
	(2.097)	(2.123)	(2.223)	(2.380)
Observations	3,097	3,097	3,097	1,794
R-squared	0.098	0.102	0.106	0.131
AIC	1,464	1,459	1,461	705
F-test: u_0 =0	7.88	7.83	7.70	4.80
Joint significance		-	-	10%

Significant at ***1%, **5%, *10%

The results of the regressions can be found in Table 7. The models obtain lower AIC scores than the POLS models. Model (5-FE) has a significant post-precautionary savings term at a 5% level. Precautionary savings are 3.5 percentage points lower in the period after the crisis than during the crisis[20]. The other precautionary terms are not significant individually, however a Wald test shows they are jointly significant at a 10% significance level. Savings increase in the crisis-period and drop again afterwards. Furthermore, the dummy for post-crisis is significant in models (3) and (4), whereas pre-crisis loses its significance compared to the Pooled OLS models. This implies that total financial wealth is lower after the crisis. Financially literacy is now significantly negatively associated with financial wealth, which is counterintuitive. Those who are financially restricted are not significantly showing lower financial wealth levels anymore either.

FE- var(p_{JLHH})

Only one model provides a significant precautionary savings term. A cause could be flawed measurement of income variance. Being fired is the biggest income risk individuals face (Mastrogiacomo and Alessie, 2014), and could be a better subjective proxy of income uncertainty. The FE models (1d-5d) have been re-estimated with *var(p_{JLHH})* as dependent variable, replacing *(σ^2_y/Y_{it})*. Again, the F-test of the FE regression rejects the hypothesis of homogenous intercepts, thus FE specifications are appropriate. The results can be found in Table 8.

Models (3d-5d) show significant negative precautionary terms for the pre-crisis period at a 5% significance level. The precautionary savings levels were 7.5, 7.2, and 10.6 percentage points lower before the crisis than during. The Wald test indicates that the precautionary terms of Model (3d) are jointly significant at 10%, and in Model (5d) these terms are jointly significant at a 5% level. The pre-crisis dummy is significant in Model (5d), whereas the post-crisis dummy was significant in models (3-FE) and (4-FE). Financial literacy still has a negative coefficient, although this coefficient is not significant anymore.

To be able to make a fair comparison between the two proxies for income uncertainty, the respective samples must be identical. This is provided by models (2b)-(5b) which re-estimate (2-FE)-(5-FE) with the sample sizes of models (2d)-(5d). The results of models (2-FE)-(5-FE) are comparable to (2b)-(5b) with comparable AIC scores. The time dummies gain joint significance in Model (3b). Since Model (5) performs best with significantly lower AIC scores, the remainder of regressions will be performed on sample 4 for both measures of income risks.

[20] $\%\text{ of precautionary savings} = 1 - (1/(\exp((\sum b_i) * \overline{(\sigma 2y/Y\imath t)})))$ (Mastrogiacomo and Alessie, 2014), where b_i are the coefficients of the precautionary savings terms.

Table 8. Regression outputs relevant variables on *LN(A_{it}/Y_{it})*, FE, White errors, Proxy: *var(p_{JLHH})*.

VARIABLES	2d	3d	4d	5d
LN(Y_{it})	-0.405***	-0.402***	-0.403***	-0.430***
	(0.0474)	(0.0478)	(0.0477)	(0.0689)
Var(P_{JLHH})$_{it}$	-0.175	0.0769	0.0693	0.0207
	(0.157)	(0.173)	(0.173)	(0.265)
Var(P_{JLHH})$_{it}$*Pre		-0.816**	-0.788**	-1.146***
		(0.340)	(0.342)	(0.409)
Var(P_{JLHH})$_{it}$*Post		0.160	0.189	0.101
		(0.400)	(0.400)	(0.635)
Θ_{it}			-0.0178	0.00685
			(0.0283)	(0.0405)
Pre-crisis		0.0727	0.0625	0.120*
		(0.0461)	(0.0478)	(0.0668)
Post-crisis		0.0695	0.0614	0.0370
		(0.0515)	(0.0517)	(0.0863)
Age	0.166	0.177	0.212	0.0718
	(0.148)	(0.146)	(0.152)	(0.164)
Age^2	-0.00318	-0.00361	-0.00438	-0.00152
	(0.00319)	(0.00314)	(0.00327)	(0.00358)
$Age^3/10^2$	0.00213	0.00250	0.00302	0.00128
	(0.00223)	(0.00220)	(0.00229)	(0.00254)
Family Size	0.0214	0.0161	0.0146	-0.0871
	(0.0660)	(0.0640)	(0.0630)	(0.142)
Children	0.0616	0.0671	0.0670	0.176
	(0.0957)	(0.0934)	(0.0923)	(0.185)
Self-employed			-0.0211	-0.0380
			(0.0705)	(0.131)
Public-sector			0.0617	-0.0189
			(0.0498)	(0.0870)
Cohort Dummies			Yes	Yes
Precautionary Motive			-0.0166	-0.0288
			(0.0111)	(0.0178)
Stock Invested				0.271***
				(0.0813)
Financially Literate				-0.0789*
				(0.0454)
Fired within HH				-0.0557
				(0.0693)
Financially Struggling				-0.0547
				(0.0439)
Constant	1.580	1.577	1.251	4.330*
	(2.200)	(2.181)	(2.293)	(2.452)
Observations	3,012	3,012	3,012	1,717
R-squared	0.100	0.109	0.112	0.147
AIC	1,475	1,453	1,457	702
F-test: u_0 =0	7.70	7.60	7.60	4.60
Joint Significance	-	10%	-	5%

Significant at ***1%, **5%, *10%

Using net worth instead of financial wealth results in the post-crisis dummy gaining significance for both Model (5b) and Model (5d). This comes at the expense of the significance of the interaction term of earnings risk with post-crisis. The same occurs when Model (5) runs without the variable *struggling*.[21] Running a FE regression with the interaction of the terms p_{JLHH}^2 and $var(p_{JLHH})$ as a proxy for income risk yields comparable results to the (d) models.

Risk Aversion Interactions

Barrios et al. (2009) found that the change in risk premia for government bonds is mainly driven by increases in absolute risk aversion and rising debt levels of governments. Being one of the main drivers of precautionary savings, the effects of the crisis could be channeled through changes in risk aversion. The risk aversion dummy is significant in the POLS models, yet not in the FE models.

The RA models include interaction variables with risk aversion, which has not altered the AIC score much when comparing to previous specifications. These interactions do not improve the explanatory strength of the regressions. The regression outputs can be found in the second and third row of Table 9. Model (5b-RA) illustrates a significant precautionary term when income variance interacts with both the risk aversion and pre-crisis dummy, and when it interacts with risk aversion. The second implies that during the crisis, risk averse individuals save 3.1 percentage points more than those who are not. The first coefficient, together with the second, implies that the risk averse save 1.3 percentage points less before the crisis than the non-risk averse. Risk averse individuals saved less precautionary before the crisis compared to the non-risk averse, however they respond more heavily to the increase in uncertainty during the crisis. Therefore, they save more precautionary during the crisis than the non-risk averse. The six precautionary savings terms are jointly almost significant at 10%.The interaction term of unemployment variance with the pre-crisis is significant at a 1% level in Model (5d-RA). This translates into 15.5 percentage points lower precautionary savings before the crisis than during the crisis for all risk types. All precautionary terms (Bd-Gd) are jointly significant at a 5% level. This also holds for the three original precautionary terms (Bd-Dd). All variables related to the time dummies together with the variance term are jointly significant at 10%. The time related variables are not jointly significant without unemployment variance. The risk aversion terms, and the risk aversion terms together with the variance term are not jointly significant either. These results can be found at the bottom of Table 9. The risk aversion terms and their interactions yield lower F-statistics and t-statistics for significance than the crisis dummies, implying that risk aversion does not influence asset accumulation more than time dummies.

[21] Since the question has not been asked every year, this variable decreased sample size with 1,000 observations.

Table 9. Risk aversion interaction, Sensitivity 1 & 2, $LN(A_{it}/Y_{it})$, both proxies, FE, robust errors.

#	VARIABLES	5b-RA	5d-RA	5b-S1	5b -S2
A	$LN(Y_{it})$	-0.453***	-0.430***	-0.382***	-0.444***
		(0.0719)	(0.0688)	(0.116)	(0.0836)
B	σ^2_y/Y_{it}	-1.89e-05		-5.38e-05	7.69e-05**
		(3.39e-05)		(3.50e-05)	(3.31e-05)
C	σ^2/Y_{it} *Pre	3.88e-05		0.000133***	-5.94e-05
		(4.70e-05)		(4.50e-05)	(4.55e-05)
D	σ^2/Y_{it} *Post	-5.56e-05		-0.000100***	-0.000130
		(4.41e-05)		(3.57e-05)	(0.000163)
E	σ^2/Y_{it} *Pre*ϴ	-0.000121*			
		(6.24e-05)			
F	σ^2/Y_{it} *Post*ϴ	-0.000130			
		(0.000146)			
G	σ^2/Y_{it} *ϴ	8.68e-05*			
		(4.49e-05)			
Bd	$Var(P_{JLHH})_{it}$		0.345		
			(0.377)		
Cd	$Var(P_{JLHH})_{it}$*Pre		-1.641***		
			(0.607)		
Dd	$Var(P_{JLHH})_{it}$*Post		0.909		
			(1.467)		
Ed	$Var(P_{JLHH})_{it}$*Pre*ϴ		-1.054		
			(1.670)		
Fd	$Var(P_{JLHH})_{it}$*Post *ϴ		0.688		
			(0.770)		
Gd	$Var(P_{JLHH})_{it}$ *ϴ		-0.432		
			(0.435)		
H	Pre*ϴ	0.0319	0.345		
		(0.0803)	(0.106)		
I	Post*ϴ	-0.00308	0.0310		
		(0.125)	(0.173)		
J	ϴ	-0.0170	0.0541	0.0376	-0.0204
		(0.0509)	(0.0644)	(0.0511)	(0.0630)
K	Pre-crisis	0.000315	0.172*	-0.0356	0.0757
		(0.0861)	(0.0995)	(0.0729)	(0.0785)
L	Post-crisis	0.0871	0.0150	0.151*	0.0782
		(0.117)	(0.151)	(0.0865)	(0.0867)
	Age	0.0868	0.0696	0.168	0.0139
		(0.170)	(0.167)	(0.226)	(0.208)
	Age^2	-0.00178	-0.00147	-0.00457	0.000197
		(0.00370)	(0.00364)	(0.00485)	(0.00459)
	$Age^3/10^2$	0.00140	0.00125	0.00386	-6.58e-05
		(0.00261)	(0.00258)	(0.00340)	(0.00329)
	Family Size	-0.103	-0.0747	-0.0901	0.0458
		(0.145)	(0.141)	(0.202)	(0.125)
	Children	0.204	0.164	0.303	-0.00499
		(0.190)	(0.183)	(0.260)	(0.119)
	Self-employed	-0.0378	-0.0301	-0.116	-0.00353
		(0.136)	(0.130)	(0.138)	(0.219)
	Public-sector	-0.0397	-0.0253	0.148	0.0676
		(0.0908)	(0.0883)	(0.129)	(0.110)
	Cohort Dummies	Yes	Yes	Yes	Yes

Precautionary Motive	-0.0316*	-0.0299*	-0.0257	-0.0178
	(0.0185)	(0.0178)	(0.0206)	(0.0239)
Stock Invested	0.268***	0.268***	0.241**	0.289***
	(0.0839)	(0.0831)	(0.117)	(0.0955)
Financially Literate	-0.0735	-0.0811*	-0.0483	-0.0968
	(0.0452)	(0.0452)	(0.0645)	(0.0631)
Fired within HH	-0.0401	-0.0551	0.0193	-0.0933
	(0.0686)	(0.0695)	(0.113)	(0.0880)
Financially Struggling	-0.0617	-0.0560	-0.0706	-0.0673
	(0.0442)	(0.0440)	(0.0512)	(0.0595)
Constant	4.297*	4.236*	2.365	4.067
	(2.549)	(2.488)	(3.051)	(2.997)
Observations	1,717	1,717	1,033	1,179
R-squared	0.140	0.149	0.170	0.143
AIC	726	707	-48	449
Joint Significance (B(d)-D(d))	-	5%	10%	10%
Joint Significance (B(d)-G(d))		5%		
Joint Sign. (C(d)-F(d)+H+I)	-	-		
Joint Sign. (B(d)-F(d)+H+I)	-	10%		
Joint Sign. (E(d)-(G(d)+J)	-	-		
Joint Sign. B(d)+(E(d)-(G(d)+J)	-	-		

Significant at ***1%, **5%, *10%

Sensitivities

For the sensitivity analysis, three separate adjustments are made. First, the S1-models exclude those who have a larger expected income change than 15%. This is the maximum amount someone could change their expected income in the dataset of Mastrogiacomo and Alessie (2014). This restriction can deter the extreme income changes which the model cannot explain. Sample size decreases to 1,033. The second adjustment excludes those who change their risk appetite more than twice, which accounted for 946 individuals. Additionally, of the remaining sample those who drastically change their risk aversion are assumed to have misread the scale. They have been assigned the value of the previous period in the S2-models.[22] The last sensitivity excludes those with negative financial wealth. Financial wealth is not positive for 19% of the sample which is rather high and could cause deviations from the paper of Mastrogiacomo and Alessie (2014), of whom the amount individuals with negative net worth was 9 percentage points lower than this paper.

The AIC of both S1 models drops to negative values, indicating that the model has gained explanatory power. Both interaction terms with the earnings variance in Model (5b-S1) are significant at 1%. During the crisis, precautionary savings were 2.8 percentage points lower than before the crisis. After the crisis, precautionary savings dropped with another 2.2 percentage points. The earnings variance terms are jointly significant at 1%. In the original

[22] Changing their answer to the relevant question from 'absolutely agree' to 'absolutely disagree' by changing their answer with at least 5 points (scale 1-7). 14 people changed their answer with at least 5 points.

regression of Model (5b), only post-crisis precautionary savings are significant at 5%. The post-crisis dummy is significant at 10%, indicating the level of savings increased during this period. In Model (5d-S1) the result hardly changed compared to (5d). This output can be found in Appendix B. Model (5b-S1) can be found in Table 9.

Risk aversion did not gain significance in the second sensitivity by excluding those with volatile risk aversion. The precautionary savings term is significant in Model (5b-S2), which indicates that for precautionary savings make up 2.8% of financial wealth during the crisis. The income variance term interaction with the post-crisis dummy loses its significance. Table 9 illustrates these outcomes. The interaction term of the pre-crisis dummy with the variance term are not significant anymore in Model (5d-S2). The precautionary savings terms are jointly significant, thus precautionary savings do influence financial wealth in this model. Financial literacy and the dummy for post-crisis also lost significance compared to the original model.

The final sensitivity only marginally changed the results compared to the basic models. Model (5-S3) illustrates a drop of 3.0 percentage points in precautionary savings after the crisis instead of 3.8 and Model (5d-S3) finds an increase of 8.6 percentage points during the crisis compared to 10.6. Financial literacy lost its significance in both models and the pre-crisis dummy lost significance in Model (5d-S3) as well. The results of the Model (5d-S2) and both (S3) models can be found in Appendix B.

Significant effects of the crisis on the size of precautionary savings are found, yet only for one regression (5-S2) the level of precautionary savings is known. For the other regressions, joint significance is found. This indicates that at least one precautionary savings term is significant from zero. This effect can be found in the interaction terms, which provides information on differences between the levels of precautionary savings for each period. The relatively small amount of significant precautionary terms compared to previous research can arise from attenuation bias, which is caused by measurement errors. These errors add white noise terms to the measurement of the relevant variable, increasing its variance. Because of this, the explanatory variable is less related to the dependent variable in models than reality, which decreases both economic and statistical relevance.[23] Using the subjective variance of unemployment risk as a proxy for earnings uncertainty increases the economic significance of precautionary savings. Where the first proxy yields changes no larger than 4.5%, the second proxy finds values up to 15.5%. It could imply that the attenuation bias is diminished due to smaller measurement errors with this proxy.

[23] More formally, the coefficient is determined by dividing the covariance of dependent and independent variable by the variance of the independent variable. When this increases, the size of beta decreases.

6. Conclusion and Policy Recommendations

Previous research into precautionary savings has shown that its economic relevance varies per country and estimation method of income uncertainty. When subjective measures are used, economic relevance is generally smaller with precautionary savings making up about 4% of savings (Kennickell and Lusardi, 2004). Using objective measures, the size increases to 30% (Mastrogiacomo and Alessie, 2014). Using the appropriate proxy for income uncertainty, in their case eligibility to unemployment benefits, and aggregating risk on household level, the objective and subjective measure provide comparable outcomes. This paper uses the subjective earnings risk reported by Dutch households during 2004-2016 as the initial measure of income risk to estimate the effect of the crisis on precautionary savings. As an alternative, the variance of unemployment risk on household level was used.

This paper finds that the measure of subjective income variance yields lower statistically and economically significant results than the proxy regarding unemployment risk. Approximations of the exact level of precautionary savings could only be found in one model for the level of during the crisis, which equaled 2.7% of financial wealth. This is a rather economically insignificant result. However, the effects of the crisis on the level of precautionary savings yielded larger differences of a higher level, reaching up to a 15% difference between precautionary savings before and during the crisis. This is achieved when the proxy for earning uncertainty is variance of unemployment risk. The other proxy, income variance, yielded the result of lower precautionary savings after the crisis of about 3% compared to during the crisis. When the risk aversion type was accounted for, one finds that before the crisis, risk averse individuals save less precautionary than the non-risk averse. However, during the crisis risk averse individuals exhibited more precautionary savings than the non-risk averse. A possible explanation of non-risk averse people having more precautionary savings before the crisis is that risk averse saved more regardless of income risks before the crisis, which lowers the need for an additional buffer against income risks. Yet when the crisis started, the risk averse individuals responded more heavily to the increase in uncertainty than the non-risk averse. The risk averse insignificantly show higher savings in the period before the crisis.

The proxy of unemployment risk increases the significance of the models and is deemed to be a suitable alternative measure of income uncertainty. Exogeneity of the original proxy of income uncertainty, earnings variance, cannot be rejected. As a result, an IV has not been implemented, as opposed to comparable papers. This paper's insignificant precautionary savings terms, when the identical initial regression of Mastrogiacomo and Alessie (2014) is performed, do suggest that the measure of earnings variance in this paper might suffer from measurement errors. Especially since the model's explanatory power increased when only the reasonable ranges for income changes were included in the regressions.

Risk aversion hardly influenced one's level of financial wealth, and only has significant influences when it interacts with the uncertainty proxies. The other controls proposed in this paper increased explanatory power of the models, and thus reducing the problem of omitted variable bias. Precautionary terms were only significant when these controls were added. Investing in stocks is an important variable for the model, being strongly positively significant in all models. Financial literacy has proven to be significant in multiple model specifications, however a peculiar negative sign is found. This could also be caused by generally higher savings.

Based on the results in this paper, it can be concluded that during the crisis the Dutch population exhibited more precautionary behavior in terms of higher savings than in periods before and after the crisis. This is in line with the finding of Broadway and Halsken (2017), however they find that precautionary savings overshoot during the Great Recession. The higher level of precautionary savings during the crisis does not necessarily prove overshooting for this data set. When uncertainty increases, the rational response of a prudent agent is to increase savings, yet if there is overshooting in savings, this is a suboptimal outcome from a welfare perspective. When overshooting occurs, the government should tackle this inefficiency. Also, when one cannot speak of overshooting a drop in consumption during economic downturn amplifies the problem of a decelerating economy. In order to stimulate the economy, governments could provide additional security to employees to overcome subjective income uncertainty. Putting more restrictions in place to complicate firing employees during economic downturn hurts employers. Increased unemployment benefits during economic downturn could provide a solution, yet one must be weary of moral hazard if doing so. Employees would not be incentivized to search for a new job if these benefits are too high.

For future research on precautionary savings, using the variance of unemployment risk as proxy for earnings uncertainty, offers great possibilities. This variable seems to suffer less from measurement errors and focuses on the main earnings uncertainty employees face, which is unemployment. The other proxy for earnings uncertainty, earnings variance, yields more favorable results when restricted to sensible ranges of income changes, and these restrictions are advised to implement in future research as well. Real income changes are what really drives agents, thus better results could be obtained when inflation rates are included, especially when inflation rates rise again. By including more post-crisis years in future papers, the difference between the crisis and the post-crisis period can be evaluated better, because this paper only has information on two years of post-crisis circumstances. This inclusion of more observations could improve the economic and statistical significance of comparable models. Also, research into the differences in precautionary savings for those who invest in stocks, and those who are financially literate would be an interesting expansion of current literature. These variables have shown to significantly influence the level of assets and due to this difference in financial buffer could exhibit different precautionary behavior.

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Appendix

Appendix A: Variables

Definitions:

Financial wealth: Sum of current assets and current liabilities

Net worth: Sum of financial assets, illiquid assets and mortgages.

Current assets: Savings, deposits, saving certificates, growth funds, mutual funds, bonds, shares, money lend out, other investments, life-course savings and savings at the employer. If checking-accounts are positive they are added.

Current liabilities: Personal loans, credit lines, other loans, remaining loans, loans from the family, study loans, credit cards, other debt and arrears. If checking-accounts are negative they are added as well.

Illiquid assets: Real-estate, cars, motorcycles, boats, campers, annuity insurance and endowment insurance.

Construction:

Example of value ranges offered to respondents. For all values except 15, the value of assets was determined as the average of the value range. For 15, the asset/liability was given the lower bound.

"Into which of the categories mentioned below did the remaining debt go?
1 less than € 50 ....FAMI1
2 € 50 to € 250 ....FAMI1
3 € 250 to € 500 ....FAMI1
4 € 500 to € 750 ....FAMI1
5 € 750 to € 1.000 ....FAMI1
6 € 1.000 to € 2.500 ....FAMI1
7 € 2.500 to € 5.000 ....FAMI1
8 € 5.000 to € 7.500 ....FAMI1
9 € 7.500 to € 10.000 ....FAMI1
10 € 10.000 to € 11.500 ....FAMI1
11 € 11.500 to € 14.000 ....FAMI1
12 € 14.000 to € 17.000 ....FAMI1
13 € 17.000 to € 20.000 ....FAMI1
14 € 20.000 to € 25.000 ....FAMI1
15 € 25.000 or more FAMI1
-9 don't know ....FAMI1"

Changes in survey:

- Savings earned at employer has been adjusted.

- Number of loans on estate have been decreased.
- Growth fund has been deleted from the survey since 2008.
- Life course something added in the survey 2007

Creation of variables:

Working:

Respondents gave contradicting answers regarding occupation. The question which asks specifically about primary occupation was used as the leading variable, yet if at least one question would suggest employment, the person is classified as part of the working population. Education: Special education added to other education, since this group was very small. No one of the heads has no education. All the high school groups have been merged into one group as well.

Risk Aversion:

"I think it is more important to have safe investments and guaranteed returns, than to take a risk to have a chance to get the highest possible returns."

Answer the following question, where a score of at least 5 out of 7 would classify someone as 'Risk averse'

Motivation for precautionary savings:

"To save to have some savings to cover unforeseen expenses"

Used as a scale variable.

Struggling financially[24]:

"if necessary, we/I can reduce our/my household's expenditures by 5% without a problem"

Answer the following question, where a score of at least 5 out of 7 would classify someone as 'Struggling'

Head of household:

"BESLIS Which of the following four statements would best describe the way in which financial matters are decided in your household?

1 I leave it to my partner to decide on financial matters .... GELDH

2 My partner has more influence than me on financial decisions .... GELDH

3 My partner and I have equal influence on financial decisions .... GELDH

4 I have more influence on financial decisions than my partner does .... GELDH

5 My partner leaves the financial decisions to me… .... GELDH"

When one spouse answers 1/2/3 and the other 4/5, the one with the 4/5 score is considered the head. If this yields no dominance, it is the person registered as head of household.

[24] The relevant question is not asked during the surveys of 2008, 2010, 2012. 2014 and 2016

Appendix B: Regressions

Table B.1 IV regression, on $LN(A_{it}/Y_{it})$, White Errors. Proxy : σ^2_y/Y_{it}, IVs: $var(p_{JLHH})$ & $p_{JLHH}{}^2$

VARIABLES	2c	3c	4c	5c
σ^2_y/Y_{it}	-0.000294	-5.24e-05	-0.000198	0.000367
	(0.000224)	(0.000232)	(0.000287)	(0.000273)
σ^2/Y_{it} *Pre		-0.00194	0.000642	-0.000232
		(0.00198)	(0.00259)	(0.000740)
σ^2/Y_{it} *Post		-2.96e-05	-0.000293	-0.00247
		(0.00128)	(0.00151)	(0.00293)
$LN(Y_{it})$	0.157	0.371	0.0359	-0.0335
	(0.119)	(0.293)	(0.328)	(0.189)
ϴ			0.0855	0.159**
			(0.110)	(0.0697)
Age	0.223**	0.353	0.249	0.221
	(0.113)	(0.231)	(0.266)	(0.181)
Age^2	-0.00438*	-0.00757	-0.00463	-0.00405
	(0.00258)	(0.00540)	(0.00581)	(0.00399)
$Age^3/10^2$	0.00295	0.00538	0.00289	0.00240
	(0.00190)	(0.00399)	(0.00442)	(0.00287)
Family Size	-0.0570	-0.128	-0.0308	-0.306**
	(0.0621)	(0.133)	(0.113)	(0.119)
Children	0.00972	0.0624	-0.00652	0.227*
	(0.0759)	(0.129)	(0.108)	(0.133)
Self-employed			0.133	0.173
			(0.479)	(0.302)
Pre-crisis		0.882	-0.154	0.133
		(0.788)	(0.986)	(0.281)
Post-crisis		-0.0800	0.108	0.758
		(0.518)	(0.615)	(0.826)
Public-sector			0.189	0.140*
			(0.208)	(0.0753)
Cohort Dummies			Yes	Yes
Precautionary Motive			0.0307	-0.0648
			(0.0555)	(0.0553)
Stock Invested				0.382***
				(0.102)
Financially Literate				0.128**
				(0.0596)
Fired within HH				0.0235
				(0.0862)
Financially Struggling				-0.215***
				(0.0589)
Constant	-4.769**	-8.572	-4.494	-2.883
	(2.010)	(5.254)	(4.517)	(3.160)
Observations	3,012	3,012	3,012	1,717
Sargan (p-value)ˤ	0.019(0.89)	0.827(0.84)	5.657(0.13)	2.846(0.42)
Validity (F-Stat) ˤ	5.03	5.27	5.97	4.52
Exogeneity° (p-value)	1.642(0.20)	0.913(0.43)	0.308(0.82)	2.055(0.10)

°σ^2_y/Y_{it}, ˤ$Var(P_{JLHH}) + (P_{JLHH})^2$. Significant at ***1%, **5%, *10%

Table B.2. FE regression, $LN(A_{it}/Y_{it})$ White Errors, sample size equal to proxy var(p_{JL}). Proxy: σ^2_y/Y_{it}

VARIABLES	2b	3b	4b	5b
$LN(Y_{it})$	-0.406***	-0.409***	-0.411***	-0.450***
	(0.0471)	(0.0479)	(0.0477)	(0.0721)
σ^2_y/Y_{it}	2.83e-06	1.77e-05	1.83e-05	4.03e-05
	(1.07e-05)	(1.64e-05)	(1.65e-05)	(3.07e-05)
σ^2/Y_{it} *Pre		-2.89e-05	-2.94e-05	-4.35e-05
		(2.00e-05)	(1.99e-05)	(3.45e-05)
σ^2/Y_{it} *Post		-2.16e-05	-2.16e-05	-0.000101**
		(2.65e-05)	(2.60e-05)	(4.43e-05)
Θ			-0.0208	-0.000249
			(0.0283)	(0.0411)
Age	0.172	0.171	0.208	0.0796
	(0.147)	(0.147)	(0.153)	(0.167)
Age^2	-0.00333	-0.00343	-0.00422	-0.00163
	(0.00317)	(0.00315)	(0.00328)	(0.00363)
$Age^3/10^2$	0.00225	0.00234	0.00288	0.00130
	(0.00221)	(0.00220)	(0.00228)	(0.00256)
Family Size	0.0179	0.0133	0.0122	-0.0999
	(0.0654)	(0.0646)	(0.0637)	(0.145)
Children	0.0639	0.0689	0.0681	0.190
	(0.0954)	(0.0954)	(0.0942)	(0.190)
Self-employed			-0.0220	-0.0400
			(0.0719)	(0.136)
Pre-crisis		0.0134	0.00452	0.0205
		(0.0417)	(0.0432)	(0.0596)
Post-crisis		0.0878**	0.0826*	0.0748
		(0.0445)	(0.0445)	(0.0669)
Public-sector			0.0622	-0.0262
			(0.0498)	(0.0899)
Cohort Dummies			Yes	Yes
Precautionary Motive			-0.0171	-0.0334*
			(0.0112)	(0.0185)
Stock Invested				0.263***
				(0.0838)
Financially Literate				-0.0778*
				(0.0453)
Fired within HH				-0.0464
				(0.0688)
Financially Struggling				-0.0601
				(0.0439)
Constant	1.522	1.692	1.357	4.405*
	(2.191)	(2.211)	(2.318)	(2.501)
Observations	3,012	3,012	3,012	1,717
R-squared	0.099	0.103	0.107	0.136
AIC	1,477	1,472	1,473	726
F-test: u_0 =0	7.68	7.64	7.53	4.57
Joint Significance	-	-	-	5%

Significant at ***1%, **5%, *10%

Table B.3. Output Sensitivities 1, 2 and 3, dependent var: *$LN(A_{it}/Y_{it})$*, both proxies, FE, robust errors

VARIABLES	5d-S1	5d-S2	5-S3	5d-S3
$LN(Y_{it})$	-0.361***	-0.400***	-0.497***	-0.497***
	(0.114)	(0.0768)	(0.0625)	(0.0622)
σ^2_y/Y_{it}°	0.469	-0.539	1.65e-05	0.0830
	(0.353)	(0.388)	(2.15e-05)	(0.235)
σ^2/Y_{it} *Pre°	-1.086**	-0.814	-3.05e-05	-0.937***
	(0.483)	(0.593)	(2.59e-05)	(0.357)
σ^2/Y_{it} *Post°	0.669	-0.348	-8.11e-05**	0.685
	0.0323	(0.860)	(3.96e-05)	(0.637)
Ɵ	(0.0511)	0.00138	-0.00924	-0.000541
	0.0894	(0.0613)	(0.0440)	(0.0422)
Pre-crisis	(0.0861)	0.124	-0.0280	0.0515
	0.0812	(0.0861)	(0.0557)	(0.0629)
Post-crisis	(0.108)	0.0697	0.0343	-0.0491
	0.196	(0.110)	(0.0627)	(0.0710)
Age	(0.220)	-0.0112	0.0174	0.0350
	-0.00535	(0.205)	(0.164)	(0.161)
Age^2	(0.00474)	0.000644	-0.000578	-0.00100
	0.00453	(0.00455)	(0.00360)	(0.00355)
Age^3/10^2	(0.00333)	-0.000312	0.000752	0.00110
	-0.0767	(0.00328)	(0.00257)	(0.00253)
Family Size	(0.202)	0.0775	-0.182	-0.172
	0.246	(0.128)	(0.137)	(0.137)
Children	(0.262)	-0.0397	0.257	0.240
	-0.144	(0.123)	(0.198)	(0.196)
Self-employed	(0.144)	-0.00703	-0.0492	-0.0538
	0.156	(0.202)	(0.121)	(0.116)
Public-sector	(0.129)	0.0695	-0.0482	-0.0339
	Yes	(0.113)	(0.0711)	(0.0701)
Cohort Dummies	-0.0324	Yes	Yes	Yes
Precautionary Motive	(0.0209)	-0.0197	-0.0375**	-0.0316*
	0.263**	(0.0242)	(0.0180)	(0.0172)
Stock Invested	(0.121)	0.303***	0.206***	0.214***
	-0.0485	(0.0962)	(0.0780)	(0.0747)
Financially Literate	(0.0665)	-0.107*	-0.0241	-0.0246
	0.0373	(0.0635)	(0.0379)	(0.0371)
Fired within HH	(0.111)	-0.0759	-0.0426	-0.0534
	-0.0612	(0.0889)	(0.0690)	(0.0682)
Financially Struggling	(0.0517)	-0.0757	-0.0610	-0.0556
	2.971	(0.0599)	(0.0370)	(0.0369)
Constant	(3.147)	4.070	5.790**	6.132**
		(3.060)	(2.370)	(2.433)
Observations	1,033	1,179	1,407	1,407
R-squared	0.168	0.135	0.216	0.205
AIC	-45	436	109	88
Joint Significance	1%	10%	-	5%

Significant at ***1%, **5%, *10%

Appendix C: Figures

Figure C.1. Expected income € before/ after the rephrasing of expected income question (2007)

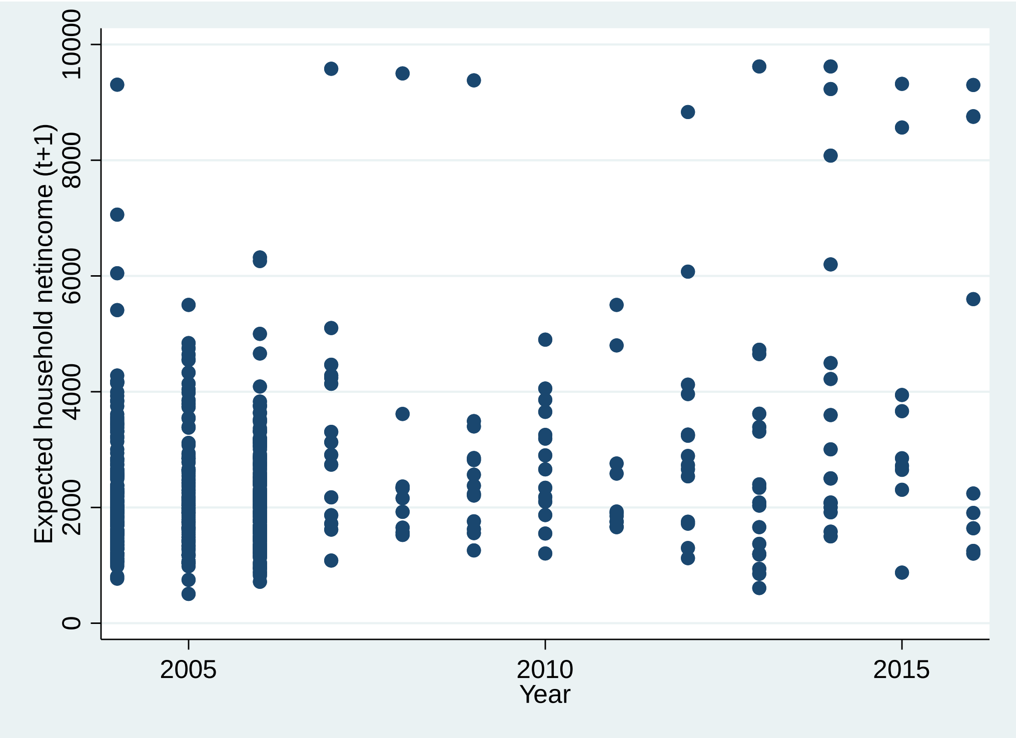

Figure C.2. Mean net worth/ financial wealth development per cohort (x€1,000)