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Nathanaël Vellekoop

# The Impact of Long-Run Macroeconomic Experiences on Personality

SAFE Working Paper No. 142

**SAFE | Sustainable Architecture for Finance in Europe**

A cooperation of the Center for Financial Studies and Goethe University Frankfurt

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## Non-Technical Summary

Psychologists often describe human personality in terms of a collection of traits. A common collection of personality traits is the “Big Five” with the acronym OCEAN: Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. The opposite of the last one is emotional stability. Personality traits have been found to be important in several domains of economics and finance: educational success, labor market outcomes (wages and unemployment), but also household finance. For example, extraversion and openness to experience are positively correlated with household debt and assets held. For young adults there is a negative correlation between conscientiousness and financial distress, and the same pattern holds for emotional stability. Personality traits explain individual behavior over and beyond commonly used characteristics as risk attitudes and time preferences.

This study focuses on the stability of personality traits over time. Earlier findings in the literature suggest a lifecycle pattern in some of the traits, e.g. emotional stability increases with age. Other studies find that personality traits are affected by major life events, like unemployment, family events, and health shocks. So far I am not aware of studies looking at the impact of past macroeconomic events on individual personality traits.

I construct a measure of lifetime experiences of aggregate unemployment, which is the amount of unemployment in a country an individual has experienced over her lifetime. This measure is a proxy for the economic environment a person has lived through, and does not necessarily capture personal unemployment experiences. Using two datasets representative for the population in the Netherlands, I find that experienced national unemployment is negatively related to four of the five personality traits. In other words, the more unemployment a person has lived through, the less emotionally stable, extraverted, agreeable, and open a person is – conscientiousness is not significantly correlated.

Moreover, since I observe the same individuals for multiple years, I can study how *changes* in experienced unemployment affect *changes* in personality. Here three surprising patterns emerge. First, personality traits change over time. Although within-person changes are small, they are systematically affected by experienced national unemployment. This suggests that personality traits are not exogenous to the economic environment and do change with it. Second, the effect is positive. More experienced unemployment – which means that one has lived through adverse economic times – is correlated with more emotional stability and higher scores of conscientiousness. The effects are large and comparable to lifecycle effects. This pattern is opposite of the level-effects, and shows the importance of the use of longitudinal data. Finally, there are strong gender differences: changes of experienced aggregate unemployment affect changes in emotional stability for men, and conscientiousness for women.

These findings support the idea that long-run macroeconomic experiences affect individual personality, in the same way that earlier studies have found that experiences of high inflation affect inflation forecasts households, and experiences of stock market crashes affect individual stock holding. Moreover, for labor economics there is the finding of long-lasting effects of recessions – students who graduate in a recession have worse labor market outcomes than students who graduate in better times. This finding is typically explained by lacking opportunities, but my findings suggest changes in the economic environment also impact individual personality traits, which in turn might affect labor market outcomes. This chain of causality is speculative for the moment, but my findings do suggest that human personality is not unaffected by the macroeconomic environment.

# The Impact of Long-Run Macroeconomic Experiences on Personality

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## Abstract

Using two datasets containing demographically representative samples of the Dutch population, I study how lifetime experiences of aggregate labor market conditions affect personality. Three sets of findings are reported. First, experienced aggregate unemployment is negatively correlated with the levels of all Big Five personality traits, except for conscientiousness (no significant correlation). Second, in panel data models with individual fixed effects I find that changes in experienced aggregate unemployment cause changes in emotional stability and agreeableness for men, and conscientiousness for women. The correlation is positive, and effects are economically large. Thirdly, I report suggestive evidence that the main driver is experienced aggregate unemployment, instead of other macroeconomic variables as experienced GDP, stock market returns or inflation. Taken together, these findings suggest that changes in Big Five personality traits are systematically related to experienced aggregate labor market conditions.

**Keywords:** Personality traits; Big five; Locus of control; labor market; unemployment.

JEL classification: D01, D12, E23, E32

PsycINFO Classification: 3120

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# 1 Introduction

Recent studies in economics show that experiences of aggregate variables impact individual beliefs and risk attitudes, and subsequently affect individual behavior. In the first paper of a series, Malmendier & Nagel (2011) find that cohorts who experienced the stock market crash in the 1920s are more risk-averse, and less likely to hold stocks compared to cohorts who did not experience this event. In a follow-up study, Malmendier & Nagel (2016) find that the same is true for inflation—cohorts who have experienced periods of high inflation have systematically higher forecasts of future inflation. A third example is Giuliano & Spilimbergo (2014), who document that individuals who grow up in a recession believe that success in life depends more on luck than effort, and show more support for government distribution. The question I examine in this study is the following: if macroeconomic experiences can shape individual beliefs, risk attitudes and economic forecasts, can it be that macroeconomic experiences affect personality traits as well?

This question is related to a longer lasting debate on the stability of personality traits, in particular the Big Five: extraversion, agreeableness, conscientiousness, emotional stability (the opposite of neuroticism), and openness to experience. Conley (1985) studies couples over a 45 year time period and finds that personality is relatively stable. Other studies support the idea of stable personality after reaching adulthood, e.g. Roberts & DelVecchio (2000); Srivastava, John, Gosling, & Potter (2003); and Terracciano, McCrae, & Costa (2010). Robins, Fraley, Roberts, & Trzesniewski (2001) survey students entering college and four years later, and find small changes in personality over time. On the other hand, Helson, Kwan, John, & Jones (2002) find evidence for non-linear lifecycle profiles, suggesting that personality traits continue to change with age. Moreover, personality traits can be affected by major life events as unemployment, divorce, or health changes. Cobb-Clark & Schurer (2012) use a longitudinal sample from Australia and report that Big Five traits are stable within person over a four-year time period, and changes are not systematically related to negative life events. Viinikainen & Kokko (2012) report similar results on stability of Big Five traits for Finland in their study on personality and unemployment.

In this paper I use two longitudinal surveys for the Dutch population, to study how the lifetime experiences of aggregate unemployment affect both the *level* of personality traits in the crosssection, as well the *changes* over time. The two surveys are independent from each other, and cover different years, but overlap for a period of five years in 2009-2014. In order to construct a measure of the amount of aggregate unemployment an individual has experienced, I use a simple average over the lifetime of the individual. I find that this measure of experienced aggregate unemployment affects negatively the level of four out of five personality traits, conscientiousness being the exception. This effect is systematic over the two surveys and years, although the size of the effect is small. When constructing changes over time within individual, I corroborate earlier findings that Big Five personality traits are quite stable over a five-year period, and changes are generally small. However, changes in experienced aggregate unemployment positively affect changes in personality, in particular emotional stability for men and conscientiousness for women. These effects are economically meaningful: a one percentage point increase in experienced

aggregate unemployment positively changes either trait with one standard deviation. In robustness checks I find that these effects are only present for individuals born in the Netherlands, who can be assumed to have experienced aggregate unemployment in the Netherlands. Concerning other macroeconomic indicators, there is no evidence that experienced stock market returns or inflation cause personality changes, and some mixed evidence for experienced Gross Domestic Product (GDP)—but GDP and unemployment are correlated.

The contribution of this paper is two-fold. In the first place, there is the novel finding that experienced aggregate unemployment systematically affects the level of personality traits, although these effects are small. This is potentially an important finding, because it shows that aggregate labor market conditions have an impact on individual personality traits, beyond other individual characteristics that are associated with personality traits. Past conditions of the labor market environment affect current personality traits. Second, I report the finding that personality changes over time are typically small, which confirms earlier findings in the literature (e.g. Conley, 1985; Salamanca, 2010; Cobb-Clark & Schurer, 2012). However, I do show that changes in personality traits are systematically related to changes in experienced aggregate unemployment. This finding is not necessarily driven by changes in personal unemployment experiences—all regressions include controls for the labor market status of the individual. Past conditions of the labor market environment affect changes in current personality traits.

These findings are not only relevant for the study of personality traits and the question how stable Big Five traits are, they also relate to the literature on labor market conditions. There is evidence that students who graduate in a recession not only face bad labor market conditions, when the economic recovers their wage growth is slower (see e.g. Kahn for the United States, 2010; Oreopoulos, Von Wachter, & Heisz for Canada, 2012; and Schmieder, Von Wachter, & Bender for Germany, 2010). My findings suggest that exposure to bad labor market circumstances has an effect on personality traits long after the recession period is over. This is relevant for studies linking personality traits and earnings (e.g. Nyhus & Pons, 2005; Groves, 2005; Drago, 2011; Cobb-Clark & Schurer, 2012; but also Roberts, 1997). Moreover, there could be another channel through which recessions affect labor market careers of graduate students: if bad labor market conditions change personality traits, then this could be another explanation for the slow start in the labor market of recent graduates.

The remainder of this study is structured as follows: in section 2 I introduce the datasets and the empirical strategy. In section 3 the results are shown in the following order: first results of experienced aggregate unemployment on the level of personality traits, then the effect on changes of Big Five traits, followed by some robustness checks and extensions. Section 4 discusses the results and section 5 concludes.

## 2 Method

### 2.1 Data

The data come from two independent, longitudinal studies for The Netherlands: the Dutch Household Survey (DHS) and the Longitudinal Internet Studies for the Social sciences (LISS). Both surveys are conducted online, and for most of the questionnaires all household members of 16 years and older are interviewed. Both datasets are similar in the sense that they aim to be representative samples of the Dutch population, provide equipment so that households without a computer or internet can participate, and survey the same households once a year until they drop out of the sample. Key differences are that the DHS is smaller, around 2,000 individuals, but available for a longer time period—in its current design since 2003. The LISS panel is more recent, since 2008, but with around 8,000 individuals much larger. Another key difference is that LISS panel members get rewarded for survey participation.

Both the DHS and the LISS field the IPIP 50-item version of the Big Five personality test (Goldberg, 1992). The personality surveys are not asked every year, and therefore I focus on three subsamples: (1) the first and last year of the longest period for both surveys together—2009 and 2014; (2) the DHS sample, for the period 2005-2015 (with quite some gaps), and (3) the LISS sample for the period 2008-2014 (with some gaps). Table 1 gives an overview of availability of personality measures for the two datasets.

Table 1: Data availability and Cronbach’s alpha

|                     | Source | 05   | 06   | 07   | 08   | 09   | 10   | 11   | 12   | 13   | 14   | 15   |
|---------------------|--------|------|------|------|------|------|------|------|------|------|------|------|
| Extraversion        | DHS    | 0.86 |      |      |      | 0.86 |      |      |      | 0.86 | 0.87 | 0.84 |
| Extraversion        | LISS   |      |      |      | 0.86 | 0.87 |      | 0.87 |      | 0.87 | 0.88 |      |
| Agreeableness       | DHS    | 0.83 |      |      |      | 0.84 |      |      |      | 0.84 | 0.85 | 0.85 |
| Agreeableness       | LISS   |      |      |      | 0.80 | 0.81 |      | 0.81 |      | 0.81 | 0.81 |      |
| Conscientiousness   | DHS    | 0.78 |      |      |      | 0.80 |      |      |      | 0.79 | 0.79 | 0.76 |
| Conscientiousness   | LISS   |      |      |      | 0.77 | 0.79 |      | 0.79 |      | 0.78 | 0.78 |      |
| Emotional stability | DHS    | 0.85 |      |      |      | 0.85 |      |      |      | 0.86 | 0.87 | 0.87 |
| Emotional stability | LISS   |      |      |      | 0.88 | 0.88 |      | 0.88 |      | 0.88 | 0.89 |      |
| Openness            | DHS    | 0.76 |      |      |      | 0.77 |      |      |      | 0.78 | 0.79 | 0.76 |
| Openness            | LISS   |      |      |      | 0.77 | 0.77 |      | 0.77 |      | 0.76 | 0.76 |      |
| Self-esteem         | LISS   |      |      |      | 0.91 | 0.91 |      | 0.92 |      | 0.92 | 0.92 |      |
| Locus of control    | DHS    | 0.69 | 0.69 | 0.72 |      | 0.72 |      | 0.71 |      | 0.72 |      | 0.72 |
| Financial risk      | DHS    | 0.67 | 0.68 | 0.67 | 0.64 | 0.66 | 0.64 | 0.66 | 0.65 | 0.62 | 0.65 | 0.61 |

The table presents the years for which personality traits are available. DHS is the Dutch Household Survey, LISS is the Longitudinal Internet Studies for the Social sciences.

### 2.2 Personality traits

The Big Five personality traits are asked in both the DHS and in the LISS panels. The wording of the questionnaires is the same, but the order in which the questions are asked

is different. Appendix A gives the wording of the questions. Respondents are asked to rate each statement on a five point scale, from (1) very inaccurate to (5) very accurate. The internal consistency reliability coefficients are high, and very similar in both surveys, ranging from 0.76 to 0.89 (Table 1). I construct two measures. First I sum up the scores for every personality trait and divide the sum by 10. Individuals with missing answers are dropped from the analysis. This procedure creates an index between 1 and 5 for each personality trait. Second, I use factor analysis on all 50 items over all years to create more comprehensive indices of personality traits. The factors of personality traits are standardized with mean zero and standard deviation of one.

Next to the Big Five measures, there are two other personality traits available, but they do not overlap in the two surveys. The respondents of the LISS panel are asked the Rosenberg self-esteem scale in almost every year in the period 2008-2015. Cronbach alpha is very good, around 0.91. For the exact wording of the questions, see Appendix B. The respondents of the DHS are asked a 13-item questionnaire of locus of control (see Appendix C for the wording). Locus of control is asked almost every other year in the period 2005-2015. The internal consistency reliability coefficients are lower than the Big Five—between 0.69 and 0.72. For both self-esteem and locus of control I use the first factor, and standardize the variables with mean zero and standard deviation one. Lastly, I construct a measure of attitudes towards financial risk taking from the DHS survey. Respondents in the DHS are asked seven questions about their attitudes towards financial risk taking (Appendix D).

## 2.3 Summary statistics

Table 2 presents the summary statistics for the three samples. The first two columns show the means for the year 2009, the first year that the Big Five survey is asked to panel members of both the DHS and the LISS. The second pair of columns shows the last year that the Big Five survey is asked to both panels, 2014. For both the DHS and the LISS panel the means of a balanced panel are shown, that is respondents who answered the Big Five survey and for which covariates are available in both years. The last two columns give the averages for all available waves, which spans the period 2005-2015 for the DHS, and the period 2008-2014 for the LISS (both with gaps). In the last two columns, both panels are unbalanced. The lower panel of the table shows the means of some covariates used in the analysis. The LISS panel is three times the size as the DHS, but is on average younger and the fraction of women is higher. Other characteristics are more balanced, except for the fraction retired, which is more pronounced in the DHS. With respect to personality traits, the two panels differ on scores for extraversion and emotional stability, and to a lesser extent on openness. Looking over the years, one can already see that changes over time are small within either panel.

Table 2: Summary statistics

|                        | 2009  |       | 2014  |       | All waves |        |
|------------------------|-------|-------|-------|-------|-----------|--------|
|                        | DHS   | LISS  | DHS   | LISS  | DHS       | LISS   |
| Extraversion           | 3.07  | 3.26  | 3.01  | 3.23  | 3.07      | 3.26   |
| Agreeableness          | 3.91  | 3.89  | 3.88  | 3.89  | 3.89      | 3.87   |
| Conscientiousness      | 3.66  | 3.74  | 3.69  | 3.77  | 3.63      | 3.71   |
| Emotional stability    | 3.60  | 3.44  | 3.60  | 3.52  | 3.54      | 3.44   |
| Openness               | 3.43  | 3.48  | 3.40  | 3.46  | 3.41      | 3.48   |
| Age                    | 55.0  | 48.4  | 60.0  | 53.9  | 52.6      | 48.4   |
| Female                 | 0.45  | 0.53  | 0.45  | 0.53  | 0.47      | 0.54   |
| Partner                | 0.77  | 0.79  | 0.74  | 0.74  | 0.77      | 0.75   |
| City                   | 0.41  | 0.39  | 0.40  | 0.38  | 0.40      | 0.40   |
| Education middle       | 0.28  | 0.33  | 0.27  | 0.34  | 0.31      | 0.34   |
| Education high         | 0.40  | 0.30  | 0.41  | 0.34  | 0.39      | 0.30   |
| Working                | 0.47  | 0.51  | 0.38  | 0.47  | 0.46      | 0.48   |
| Self-employed          | 0.04  | 0.05  | 0.05  | 0.05  | 0.05      | 0.05   |
| Unemployed             | 0.02  | 0.02  | 0.04  | 0.04  | 0.03      | 0.03   |
| Retired                | 0.27  | 0.10  | 0.36  | 0.09  | 0.25      | 0.09   |
| Children present       | 0.31  | 0.45  | 0.28  | 0.38  | 0.37      | 0.43   |
| Number of observations | 1,050 | 3,176 | 1,050 | 3,176 | 11,110    | 29,319 |

All available waves for the DHS correspond to the years 2005, 2009, and 2013-2015. For the LISS all available waves correspond to the years 2008-2009, 2011, and 2013-2014.

## 2.4 Empirical strategy

In order to test whether macroeconomic experiences affect personality traits, I construct a measure of experienced unemployment during the lifetime of each individual. Malmendier and Nagel (2011) have developed this methodology in order to construct measures of lifetime stock market experience. The empirical strategy of this paper is closer to Malmendier and Shen (2015), who also use experienced aggregate unemployment. They study the effects of experienced aggregate unemployment on consumption expenditures. Both studies use the following expression:

$$E_{it}(\lambda) = \sum_{k=1}^{age_{it}-1} w_{it}(k, \lambda) U_{t-k} \quad (1)$$

where:

$$w_{it}(k, \lambda) = \frac{(age_{it} - k)^\lambda}{\sum_{k=1}^{age_{it}-1} (age_{it} - k)^\lambda} \quad (2)$$

There are two key ingredients in the measure of experienced aggregate unemployment: the number of years over which unemployment is experienced ( $k$ ), and how the years are weighted. The first expression states that the experienced aggregate unemployment ( $E_{it}$ ) of individual  $i$  in year  $t$ , is given by a weighted average of the aggregate unemployment over a range of  $k$  years. I will use the range of years since birth. The second ingredient is the weighting function  $w_{it}$ , which is a function of  $\lambda$ . If  $\lambda = 0$ , expression (2) collapses to a normal average, where each year is weighted the same. If  $\lambda = +1$ , more weight is attached to recent experienced unemployment (weights have an increasing profile); whereas if  $\lambda = -1$ , more weight is attached to experiences earlier in life. I will use an equal weighting scheme ( $\lambda = 0$ ), and check the robustness of the results for other values of  $\lambda$ . Even with an equal weighting scheme, with the progression of age less and less weight is attached to all observations of aggregate unemployment.

Figure 1 shows the development of aggregate unemployment in the Netherlands over the period 1900-2015. These series are constructed by Statistics Netherlands and measure unemployment following the 12-hours criterion. That is, people working for less than 12 hours a week are officially counted as unemployed. The last two years of the series (2014 and 2015) come from a different time series, also provided by Statistics Netherlands.

Figure 1: Unemployment in the Netherlands, 1900-2015

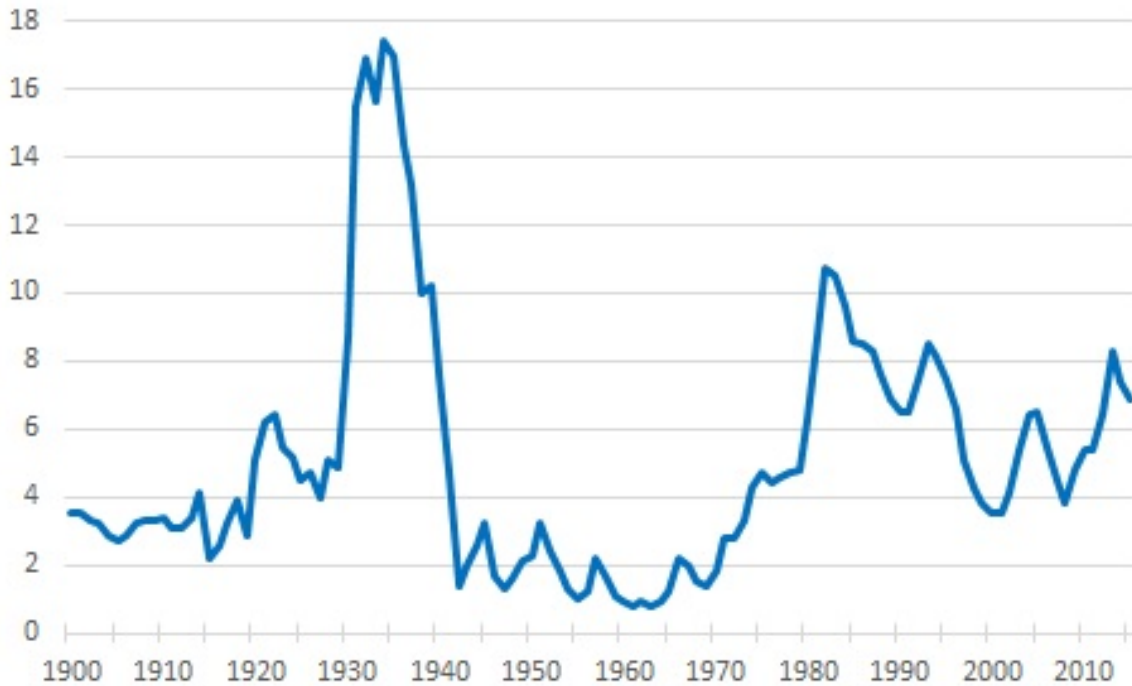
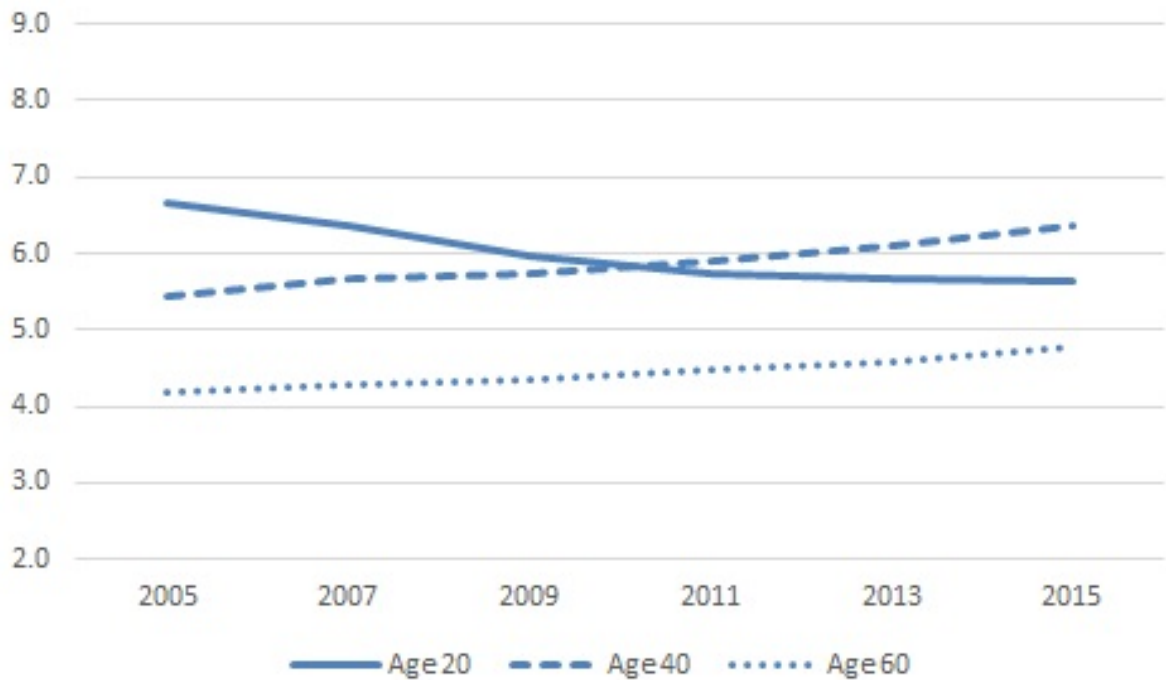


Figure 2 gives an example of the construction of experienced aggregate unemployment. In 2005, a 20-year old has experienced 6.7% aggregate unemployment over his lifetime, whereas a 60-year old in the same year has experienced 4.2%. Ten years later, in 2015, a 20-year old has experienced 5.7% unemployment, whereas a 60-year old in 2015 has experienced 4.8%. In robustness checks I will also show results for lifetime experiences of GDP, stock market returns, and inflation.

Since I observe the same individuals over time at different ages, I can study how personality is affected by the amount of aggregate unemployment one has experienced during one's lifetime. One advantage of this strategy is that the issue of causality is straightforward: past aggregate labor market conditions affect current individual personality traits. An advantage of panel data is that I can control for age and time effects, by adding age and age squared as well as year dummies. The identifying assumption is that different cohorts have similar lifecycle profiles of the development of personality traits.

Figure 2: Average experienced unemployment by age, 2005-2015



## 3 Results

### 3.1 Experienced unemployment and the level of Big Five

The first set of results pertains to the effect of aggregate labor market conditions on the level of the Big Five personality traits. For both the DHS and the LISS panel, and for each of the two years 2009 and 2014, I run a regression with one of the Big Five personality traits as the dependent variable. Tables 3-4 show for each year the results of the level of the personality trait. Results are virtually unchanged when I would use the standardized factor variables (where the factor analysis is done only for these two years). Both tables use the same balanced panel, and results are similar and even stronger with an unbalanced panel. Each regression includes dummy variables for whether a partner is present in the household, whether the individual lives in an urban area, dummies for level of education, dummies for occupational status, and a dummy for the presence of children of children in the household. The standard errors of each regression are corrected for arbitrary forms of heteroskedasticity.

In tables 3-4, an interesting pattern emerges: the more aggregate unemployment an individual has experienced during his or her lifetime, the lower the score on agreeableness, emotional stability, extraversion and openness. Conscientiousness is the only personality trait for which experienced unemployment is only marginally related to the level of the trait. A 1 percentage point increase in experienced lifetime unemployment decreases—for example—emotional stability with around 0.07 – 0.13 points on a mean of around 3.5 points. For extraversion this translates into a decrease of 0.085 – 0.109 points on a mean of 3.2 points. These patterns emerge after controlling for age, gender and other variables that are associated with personality traits. The magnitude of the effects are relatively small relative to the mean of the dependent variable, but in the case of emotional stability and openness—half the size of the gender effect, and in the case of extraversion about half the effect-size of a 10 year increase in age. The pattern is persistent: the signs are almost always the same in both samples, in both years, although not always significantly different from zero. One noticeable difference between the two samples is that the DHS has similar signs as the LISS, standard errors are relatively large. This could be due to a smaller sample in the DHS panel compared to the LISS panel, and results are underpowered in the DHS. Another reason could be that the composition of the two panels is different: the DHS is on average older and consists of more men.

Table 3: Extraversion, agreeableness, and conscientiousness, 2009 and 2014

| A. Extraversion          | DHS 2009            | DHS 2014           | LISS 2009           | LISS 2014           |
|--------------------------|---------------------|--------------------|---------------------|---------------------|
| Experienced unemployment | −0.016<br>(0.05)    | −0.010<br>(0.07)   | −0.085***<br>(0.03) | −0.109***<br>(0.03) |
| Age/10                   | 0.090<br>(0.13)     | 0.196<br>(0.17)    | −0.258***<br>(0.06) | −0.217***<br>(0.06) |
| Age/10 squared           | −0.009<br>(0.01)    | −0.016<br>(0.01)   | 0.022***<br>(0.01)  | 0.017***<br>(0.01)  |
| Female                   | 0.084*<br>(0.04)    | 0.044<br>(0.04)    | −0.011<br>(0.02)    | 0.010<br>(0.02)     |
| Adjusted R <sup>2</sup>  | 0.011               | 0.011              | 0.013               | 0.013               |
| Mean dependent variable  | 3.072               | 3.011              | 3.258               | 3.228               |
| B. Agreeableness         |                     |                    |                     |                     |
| Experienced unemployment | 0.045<br>(0.06)     | −0.004<br>(0.05)   | −0.048**<br>(0.02)  | −0.063***<br>(0.02) |
| Age/10                   | 0.308*<br>(0.18)    | 0.249*<br>(0.13)   | 0.054<br>(0.05)     | 0.049<br>(0.04)     |
| Age/10 squared           | −0.024<br>(0.02)    | −0.020*<br>(0.01)  | −0.006<br>(0.00)    | −0.004<br>(0.00)    |
| Female                   | 0.292***<br>(0.03)  | 0.303***<br>(0.03) | 0.326***<br>(0.02)  | 0.339***<br>(0.02)  |
| Adjusted R <sup>2</sup>  | 0.080               | 0.085              | 0.122               | 0.112               |
| Mean dependent variable  | 3.907               | 3.879              | 3.891               | 3.885               |
| C. Conscientiousness     |                     |                    |                     |                     |
| Experienced unemployment | 0.100*<br>(0.05)    | 0.019<br>(0.05)    | 0.040*<br>(0.02)    | 0.013<br>(0.03)     |
| Age/10                   | 0.450***<br>(0.12)  | 0.209*<br>(0.11)   | 0.102**<br>(0.05)   | 0.079<br>(0.05)     |
| Age/10 squared           | −0.037***<br>(0.01) | −0.015<br>(0.01)   | −0.003<br>(0.00)    | −0.002<br>(0.00)    |
| Female                   | 0.132***<br>(0.04)  | 0.130***<br>(0.04) | 0.108***<br>(0.02)  | 0.099***<br>(0.02)  |
| Adjusted R <sup>2</sup>  | 0.028               | 0.025              | 0.059               | 0.029               |
| Mean dependent variable  | 3.655               | 3.688              | 3.736               | 3.768               |
| N observations           | 1050                | 1050               | 3176                | 3176                |

All regressions include the following variables: partner, city, education dummies, dummies for occupation status, and the presence of children in the household. Robust standard errors in parentheses. \*/\*\*/\*\* correspond to 10%/5%/1%.

Table 4: Emotional stability and openness, 2009 and 2014

| D. Emotional stability   | DHS 2009            | DHS 2014            | LISS 2009           | LISS 2014           |
|--------------------------|---------------------|---------------------|---------------------|---------------------|
| Experienced unemployment | −0.050<br>(0.06)    | −0.103*<br>(0.06)   | −0.072**<br>(0.03)  | −0.132***<br>(0.03) |
| Age/10                   | −0.018<br>(0.17)    | 0.147<br>(0.11)     | −0.115*<br>(0.06)   | −0.053<br>(0.06)    |
| Age/10 squared           | 0.006<br>(0.01)     | −0.009<br>(0.01)    | 0.016**<br>(0.01)   | 0.009*<br>(0.01)    |
| Female                   | −0.175***<br>(0.04) | −0.193***<br>(0.04) | −0.223***<br>(0.02) | −0.213***<br>(0.03) |
| Adjusted R <sup>2</sup>  | 0.057               | 0.060               | 0.064               | 0.070               |
| Mean dependent variable  | 3.597               | 3.602               | 3.435               | 3.519               |
| E. Openness              |                     |                     |                     |                     |
| Experienced unemployment | −0.023<br>(0.05)    | −0.025<br>(0.05)    | −0.055***<br>(0.02) | −0.038*<br>(0.02)   |
| Age/10                   | −0.028<br>(0.13)    | 0.057<br>(0.11)     | −0.103**<br>(0.04)  | 0.004<br>(0.04)     |
| Age/10 squared           | −0.001<br>(0.01)    | −0.009<br>(0.01)    | 0.004<br>(0.00)     | −0.005<br>(0.00)    |
| Female                   | −0.031<br>(0.03)    | −0.017<br>(0.03)    | −0.080***<br>(0.02) | −0.076***<br>(0.02) |
| Adjusted R <sup>2</sup>  | 0.151               | 0.150               | 0.127               | 0.138               |
| Mean dependent variable  | 3.432               | 3.396               | 3.484               | 3.461               |
| N observations           | 1050                | 1050                | 3176                | 3176                |

All regressions include the following variables: partner, city, education dummies, dummies for occupation status, and the presence of children in the household. Robust standard errors in parentheses. \*/\*\*/\*\* correspond to 10%/5%/1%.

### 3.2 Stability of the Big Five over time

Before assessing the impact of experienced aggregate labor conditions on changes in the Big Five traits, it is useful to show the raw changes in personality traits over time. The first year that Big Five traits are observed in both panels is 2009, the last year is 2014—a five year period. This is one year longer than the four-year period that Cobb-Clark & Schurer (2012) observe for Australia, or Salamanca (2010) for the Netherlands (also using the DHS). I calculate for both the DHS and the LISS panel the within-person change for each personality trait for the years 2009 and 2014. Since the measures of personality traits take values between 1 – 5, changes are in the interval  $[-4, +4]$ . Figures 3-7 show the distribution for both panels for each personality trait. The p-value in brackets is the Kolmogorow-Smirnov test of equal distribution between the two samples.

The first observation is that over this medium run period, the personality traits of most individuals barely change— in all figures there is a notable spike at zero. A second observation is that if personality scores change, most of the changes are small: within the  $[-1, +1]$  interval. Compared to the possible range of  $[-4, +4]$ , most changes are small changes. Cobb-Clark & Schurer (2012) and Salamanca (2010) find that changes in personality traits can be attributed to life events as personal unemployment, divorce and arrival of children. In later panel data regressions I will control for individual life events, but my focus is on the impact of aggregate labor market conditions. The final observation is that changes over this medium-run time period are very similar between the LISS and the DHS panels. The two panels are independently drawn, and the distributions of changes are very similar—the only exception is emotional stability, and to some extent extraversion (with a p-value of 0.06). These findings corroborate earlier findings in the literature that Big-Five personality traits are stable over time, see e.g. Cobb-Clark & Schurer (2012) and Terracciano, McCrae & Costa (2010).

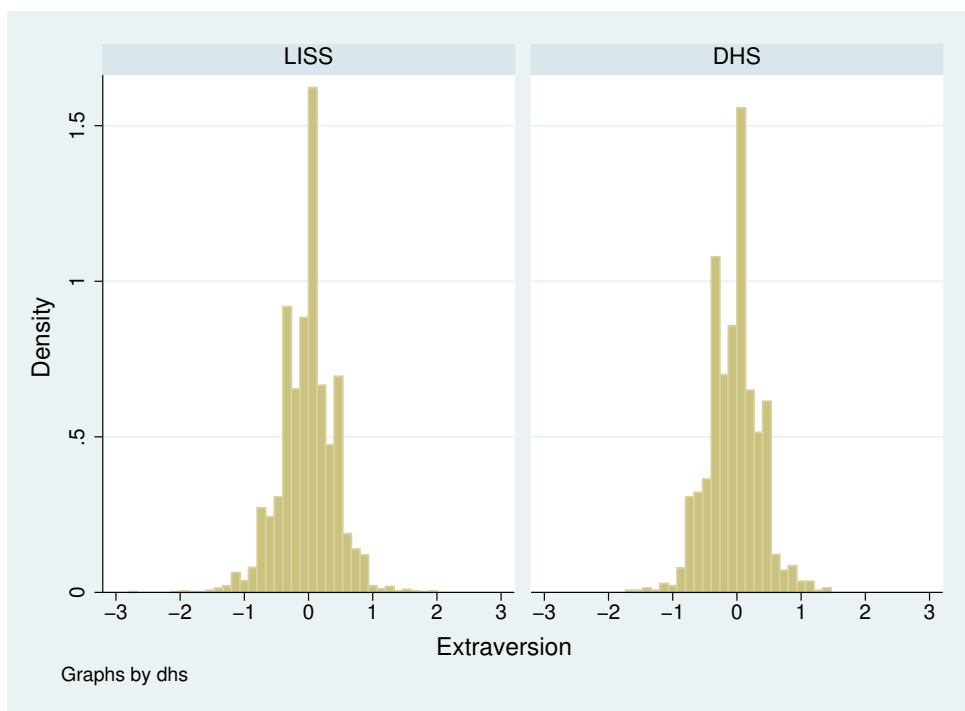


Figure 3: Within person change in extraversion over 2009 – 2014 ( $p=0.061$ )

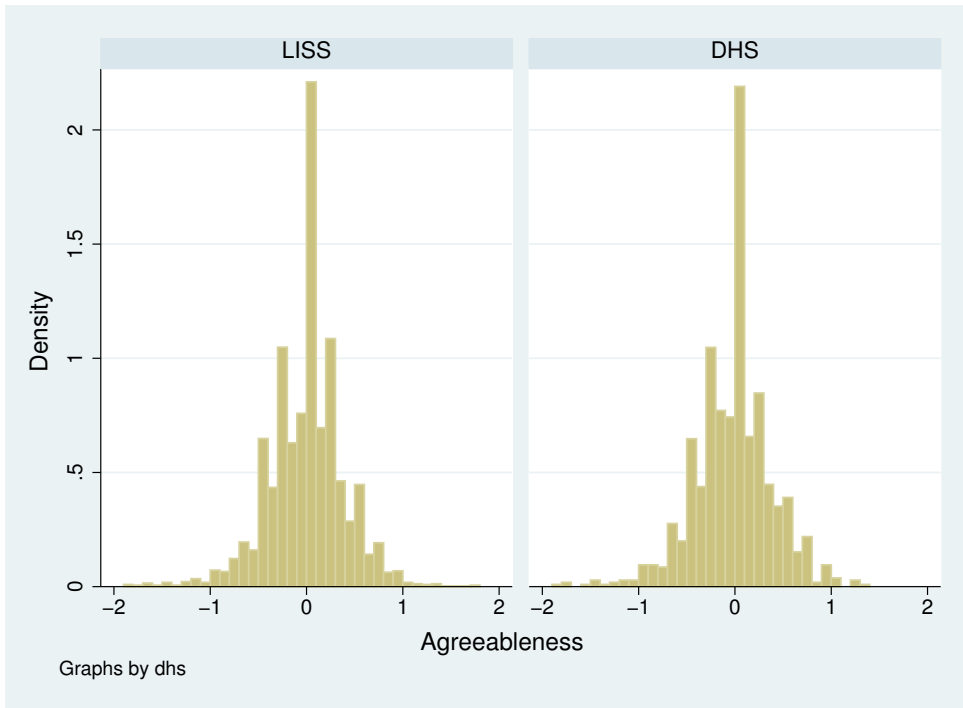


Figure 4: Within person change in agreeableness over 2009 – 2014 ( $p=0.354$ )

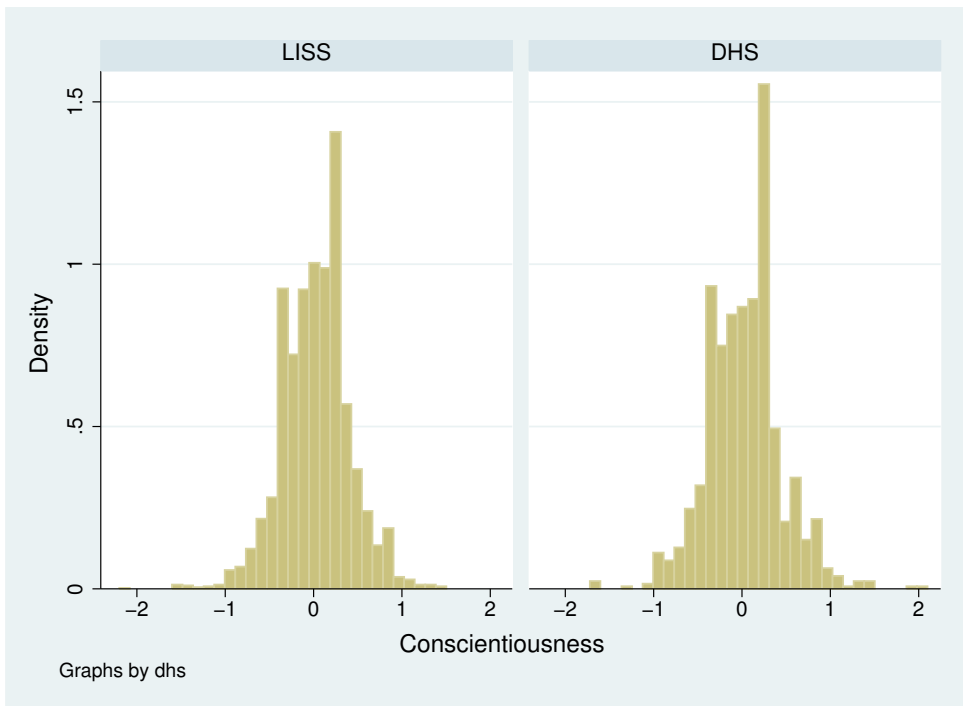


Figure 5: Within person change in conscientiousness over 2009 – 2014 ( $p=0.589$ )

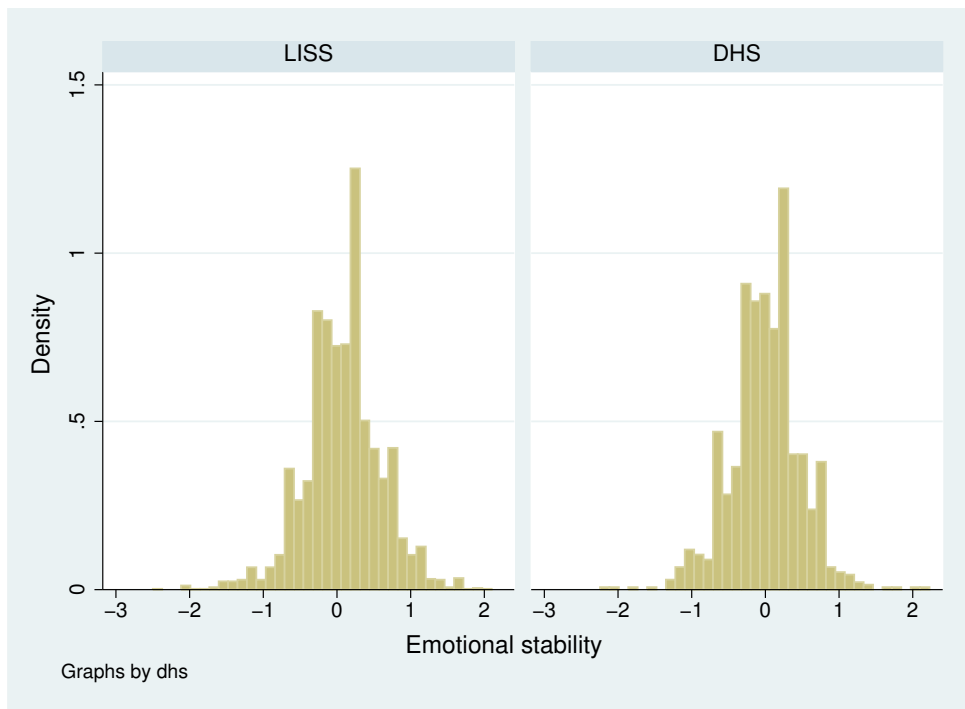


Figure 6: Within person change in emotional stability over 2009 – 2014 ( $p=0.000$ )

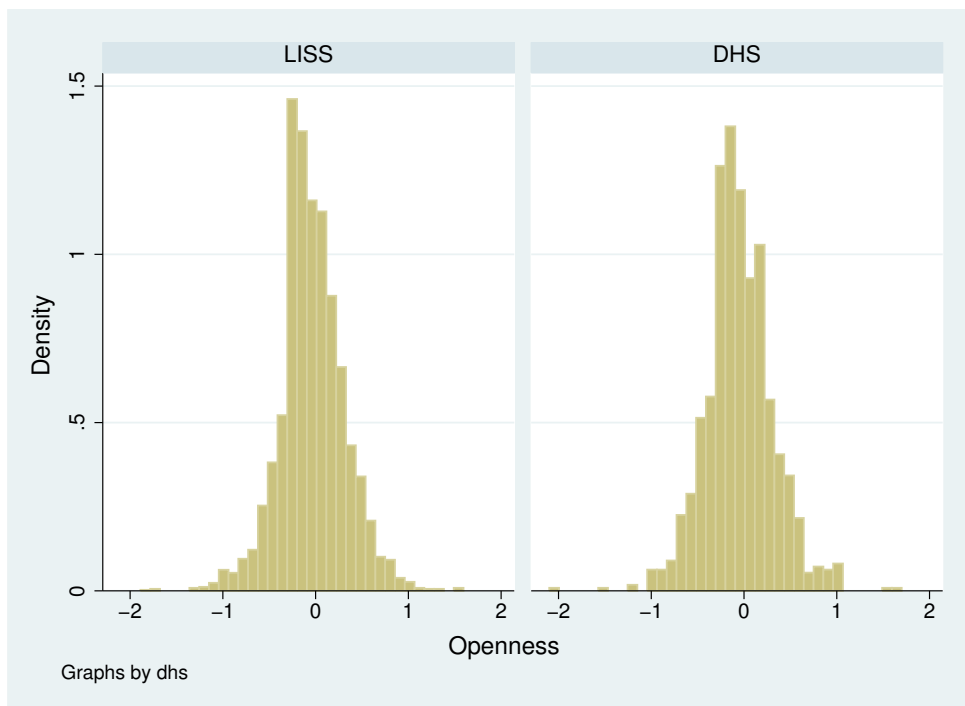


Figure 7: Within person change in openness over 2009 – 2014 ( $p=0.314$ )

### 3.3 Experienced unemployment and changes in the Big Five

In order to examine changes of the Big Five over time, I employ panel data methods with individual fixed effects, and the same set of control variables used in section 3.1. Standard errors are clustered at the level of the individual, and a year dummy for the year 2014 is included (but not reported). Table 5 shows the results for the DHS panel, and table 6 for the LISS panel. Both tables use a balanced panel (results for the unbalanced panel are very similar). The dependent variable is the standardized factor of the personality trait, where factor analysis is done over the two years 2009 and 2014 only.

The results for the DHS sample in Table 5 show a large effect of experienced aggregate unemployment on emotional stability. A one percentage point increase in unemployment changes emotional stability with 1.3 standard deviation (personality traits are standardized). In the lower two panels the regression is split by gender, and reveals that this effect is mainly driven by the men. This result is corroborated in the middle panel of Table 6, where a similar effect on emotional stability is found for the men in the LISS panel. For the women in the LISS panel more experienced aggregate unemployment has a positive change for conscientiousness. Again the effect is sizable: a one percentage point increase in experienced unemployment is associated with a one standard deviation increase in conscientiousness for the women.

Tables 7 and 8 extend the number of waves as well as the timespan for both panels. Table 7 reports the results for the DHS panel, spanning the period 2005-2015. Experienced lifetime labor market conditions still affect male emotional stability, although the coefficient is smaller. A new finding is that experienced unemployment affects male extraversion, with an effect size of 0.577 standard deviation. Table 8 shows the results for the LISS panel, for the period 2008-2014. Here we find that for men extraversion, agreeableness and emotional stability are affected by experienced labor market conditions, while for the women only conscientiousness is impacted. Differences between the DHS and the LISS panel can be due to different number of waves, different coverage of years, differences in sample size—the DHS is smaller than the LISS, and differences in panel composition. Still, findings in both panels point in the same direction: changes in experienced aggregate unemployment affect male emotional stability, and to a lesser extent male extraversion and agreeableness. For women only conscientiousness is affected by aggregate labor market conditions.

Two remarks about the interpretation of the results might be helpful. In subsection 3.1 the conclusion is that the correlations between experienced aggregate unemployment and the *level* of personality traits are systematically *negative* for four of the Big Five traits, but the effect size is small. To start with the negative coefficients—intuitively a negative correlation here would make sense. More experienced unemployment is associated with lower levels of emotional stability, openness, extraversion, and agreeableness in the crossection. However, the results on changes in personality suggest an opposite, and perhaps counterintuitive conclusion—that more experienced aggregate unemployment *increases* personality traits in a systematic way, mainly emotional stability and conscientiousness. It is important to note that this effect is not spurious, and driven by two correlated time series. Different cohorts have different profiles of experienced unemploy-

ment, some increasing and some decreasing over the same years (see Figure 2). The second remark concerns the size of the effect in the panel data analyses. The figures in subsection 3.2 show that within-person changes in personality traits over a five-year period are small. Changes in experienced aggregate unemployment are also small over a five-year period—although they differ substantially depending on the cohort. However, even though changes in personality traits over time are small, experienced aggregate unemployment is systematically correlated, and the effect size is economically large and statistically significant.

Table 5: DHS changes between 2009 and 2014

|                          | Extraversion        | Agreeableness        | Conscientiousness | Emotional stability | Openness            |
|--------------------------|---------------------|----------------------|-------------------|---------------------|---------------------|
| Experienced unemployment | −0.167<br>(0.43)    | 0.467<br>(0.52)      | −0.092<br>(0.52)  | 1.335***<br>(0.50)  | −0.041<br>(0.61)    |
| Age/10                   | −3.898***<br>(1.10) | −12.514***<br>(1.20) | −0.447<br>(1.08)  | −4.002***<br>(0.88) | −4.445***<br>(1.46) |
| Age/10 squared           | −0.003<br>(0.02)    | −0.052**<br>(0.02)   | −0.018<br>(0.02)  | −0.019<br>(0.02)    | 0.021<br>(0.03)     |
| Adjusted R <sup>2</sup>  | 0.018               | 0.027                | 0.012             | 0.018               | 0.010               |
| Mean dependent variable  | 0.001               | 0.000                | 0.000             | 0.000               | −0.000              |
| Male                     |                     |                      |                   |                     |                     |
| Experienced unemployment | 0.200<br>(0.57)     | 0.497<br>(0.73)      | 0.060<br>(0.67)   | 1.847***<br>(0.67)  | −1.159<br>(0.78)    |
| Female                   |                     |                      |                   |                     |                     |
| Experienced unemployment | −0.456<br>(0.68)    | 0.428<br>(0.82)      | −0.172<br>(0.84)  | 0.717<br>(0.82)     | 0.884<br>(1.04)     |

The rows for men and women are separate regressions, following the same specification as the top panel. The top panel includes 2,100 observations for 1,050 individuals (balanced panel). All regressions include the following variables: individual fixed effects, a year dummy, partner, city, education dummies, dummies for occupation status, and the presence of children in the household. Standard errors are clustered at the level of the individual. \*/\*\*/\*\* correspond to 10%/5%/1%.

Table 6: LISS changes between 2009 and 2014

|                          | Extraversion     | Agreeableness    | Conscientiousness   | Emotional stability | Openness          |
|--------------------------|------------------|------------------|---------------------|---------------------|-------------------|
| Experienced unemployment | 0.092<br>(0.22)  | -0.063<br>(0.27) | 0.661**<br>(0.26)   | 0.359<br>(0.25)     | -0.087<br>(0.27)  |
| Age/10                   | -0.291<br>(0.23) | -0.188<br>(0.29) | 0.528**<br>(0.26)   | 0.187<br>(0.27)     | 0.103<br>(0.29)   |
| Age/10 squared           | 0.018*<br>(0.01) | -0.005<br>(0.01) | -0.053***<br>(0.01) | 0.003<br>(0.01)     | -0.021*<br>(0.01) |
| Adjusted R <sup>2</sup>  | 0.009            | 0.002            | 0.021               | 0.032               | 0.020             |
| Mean dependent variable  | -0.000           | -0.000           | -0.000              | 0.000               | -0.000            |
| Male                     |                  |                  |                     |                     |                   |
| Experienced unemployment | 0.106<br>(0.39)  | 0.093<br>(0.50)  | 0.128<br>(0.42)     | 1.033***<br>(0.40)  | -0.120<br>(0.47)  |
| Female                   |                  |                  |                     |                     |                   |
| Experienced unemployment | 0.042<br>(0.30)  | -0.004<br>(0.34) | 1.001***<br>(0.35)  | -0.101<br>(0.33)    | 0.184<br>(0.35)   |

The rows for men and women are separate regressions, following the same specification as the top panel. The top panel includes 6,352 observations for 3,176 individuals (balanced panel). All regressions include the following variables: individual fixed effects, a year dummy, partner, city, education dummies, dummies for occupation status, and the presence of children in the household. Standard errors are clustered at the level of the individual. \*/\*\*/\*\* correspond to 10%/5%/1%.

Table 7: Big Five DHS panel, 2005-2015

| All                      | Extraversion      | Agreeableness    | Conscientiousness | Emotional stability | Openness           |
|--------------------------|-------------------|------------------|-------------------|---------------------|--------------------|
| Experienced unemployment | 0.193<br>(0.18)   | 0.081<br>(0.21)  | 0.099<br>(0.22)   | 0.422**<br>(0.19)   | 0.184<br>(0.21)    |
| Age/10                   | -1.782*<br>(1.02) | -0.796<br>(2.04) | -2.512<br>(1.93)  | -2.282*<br>(1.35)   | -0.047<br>(1.05)   |
| Age/10 squared           | -0.011<br>(0.01)  | -0.001<br>(0.01) | -0.019*<br>(0.01) | -0.003<br>(0.01)    | -0.028**<br>(0.01) |
| Adjusted R <sup>2</sup>  | 0.005             | 0.007            | 0.006             | 0.020               | 0.009              |
| Mean dependent variable  | 0.000             | 0.001            | -0.000            | 0.000               | -0.000             |
| Male                     |                   |                  |                   |                     |                    |
| Experienced unemployment | 0.577**<br>(0.24) | -0.305<br>(0.27) | 0.188<br>(0.30)   | 0.696***<br>(0.24)  | -0.160<br>(0.28)   |
| Female                   |                   |                  |                   |                     |                    |
| Experienced unemployment | -0.112<br>(0.26)  | 0.406<br>(0.35)  | -0.014<br>(0.34)  | 0.095<br>(0.30)     | 0.579*<br>(0.33)   |

The rows for men and women are separate regressions, following the same specification as the top panel. The top panel includes 11,110 observations for 5,046 individuals (unbalanced panel). All regressions include the following variables: individual fixed effects, year dummies, partner, city, education dummies, dummies for occupation status, and the presence of children in the household. Standard errors are clustered at the level of the individual. \*/\*\*/\*\* correspond to 10%/5%/1%.

Table 8: Big Five LISS panel, 2008-2014

| All                      | Extraversion      | Agreeableness     | Conscientiousness   | Emotional stability | Openness            |
|--------------------------|-------------------|-------------------|---------------------|---------------------|---------------------|
| Experienced unemployment | 0.135<br>(0.11)   | 0.263*<br>(0.14)  | 0.290**<br>(0.13)   | 0.231*<br>(0.13)    | 0.014<br>(0.13)     |
| Age/10                   | -0.104<br>(0.10)  | 0.225<br>(0.15)   | 0.527***<br>(0.11)  | -0.110<br>(0.12)    | 0.267**<br>(0.13)   |
| Age/10 squared           | 0.015**<br>(0.01) | -0.009<br>(0.01)  | -0.047***<br>(0.01) | 0.011<br>(0.01)     | -0.026***<br>(0.01) |
| Adjusted R <sup>2</sup>  | 0.004             | 0.008             | 0.009               | 0.018               | 0.015               |
| Mean dependent variable  | -0.000            | 0.000             | -0.000              | 0.001               | 0.000               |
| Male                     |                   |                   |                     |                     |                     |
| Experienced unemployment | 0.319*<br>(0.19)  | 0.488**<br>(0.24) | -0.146<br>(0.21)    | 0.475**<br>(0.20)   | 0.103<br>(0.22)     |
| Female                   |                   |                   |                     |                     |                     |
| Experienced unemployment | -0.024<br>(0.15)  | 0.073<br>(0.17)   | 0.569***<br>(0.16)  | 0.078<br>(0.17)     | -0.083<br>(0.18)    |

The rows for men and women are separate regressions, following the same specification as the top panel. The top panel includes 29,319 observations for 11,044 individuals (unbalanced panel). All regressions include the following variables: individual fixed effects, year dummies, partner, city, education dummies, dummies for occupation status, and the presence of children in the household. Standard errors are clustered at the level of the individual. \*/\*\*/\*\* correspond to 10%/5%/1%.

### 3.4 Robustness checks

A natural robustness check would be to vary the exposure to aggregate unemployment in the Netherlands. The only variable that comes close is whether an individual is born in the Netherlands or not. This variable is only available in the LISS survey, not in the DHS. Also, I have no information about the age when a panel member migrated to the Netherlands. Therefore I run the main regression separately for those born in the Netherlands and those who are not born. Table 9 shows the results of both regressions. The results support the main findings. The individuals who are born in the Netherlands, are presumably longer exposed to aggregate unemployment in the Netherlands. Some of the Big Five traits of those who are born in the Netherlands, are impacted by experienced aggregate unemployment. The personality traits of those born outside the Netherlands are not affected by the unemployment level in the Netherlands, but the standard errors are large.

Table 9: Big Five by born in the Netherlands, LISS panel, 2008-2014

| Born in the Netherlands     | Extraversion      | Agreeableness      | Conscientiousness   | Emotional stability | Openness            |
|-----------------------------|-------------------|--------------------|---------------------|---------------------|---------------------|
| Experienced unemployment    | 0.118<br>(0.12)   | 0.313**<br>(0.14)  | 0.295**<br>(0.14)   | 0.284*<br>(0.15)    | 0.039<br>(0.15)     |
| Age/10                      | -0.150<br>(0.11)  | 0.368**<br>(0.17)  | 0.588***<br>(0.12)  | -0.109<br>(0.13)    | 0.269*<br>(0.14)    |
| Age/10 squared              | 0.017**<br>(0.01) | -0.022**<br>(0.01) | -0.050***<br>(0.01) | 0.011<br>(0.01)     | -0.029***<br>(0.01) |
| Adjusted R <sup>2</sup>     | 0.004             | 0.009              | 0.010               | 0.020               | 0.015               |
| Mean dependent variable     | -0.005            | 0.013              | 0.024               | 0.030               | -0.010              |
| N individuals               | 7680              | 7680               | 7680                | 7680                | 7680                |
| N observations              | 23032             | 23032              | 23032               | 23032               | 23032               |
| Not born in the Netherlands |                   |                    |                     |                     |                     |
| Experienced unemployment    | 0.283<br>(0.34)   | 0.126<br>(0.47)    | 0.282<br>(0.37)     | -0.014<br>(0.38)    | -0.067<br>(0.42)    |
| Age/10                      | 0.582<br>(0.41)   | -0.670<br>(0.56)   | 0.284<br>(0.45)     | -0.255<br>(0.49)    | 0.643<br>(0.57)     |
| Age/10 squared              | 0.009<br>(0.02)   | 0.060**<br>(0.02)  | -0.026<br>(0.02)    | 0.012<br>(0.02)     | -0.024<br>(0.02)    |
| Adjusted R <sup>2</sup>     | 0.006             | 0.014              | 0.006               | 0.018               | 0.022               |
| Mean dependent variable     | 0.011             | -0.095             | -0.134              | -0.142              | 0.044               |
| N individuals               | 1802              | 1802               | 1802                | 1802                | 1802                |
| N observations              | 4046              | 4046               | 4046                | 4046                | 4046                |

All regressions include the following variables: individual fixed effects, year dummies, age and age squared partner, city, education dummies, dummies for occupation status, and the presence of children in the household. Standard errors are clustered at the level of the individual. \*/\*\*/\*\* correspond to 10%/5%/1%.

Another robustness check is to see whether other aggregate indicators like GDP, stock market returns, or inflation affect personality. The time series for GDP and inflation are collected from Statistics Netherlands, where the series on GDP only start in 1922, and has a gap between 1940 and 1949. The series on stock market returns on the Amsterdam stock exchange are only available as of 1953 and consist of two series: the Statistics Netherlands indicator for the period 1953-1982 and the Amsterdam Stock Exchange indicator for the period 1983-2015. One problem with the stock returns series is that the definitions differ, another is that the stock market crash of 1929 is not in the data. Malmendier & Nagel (2011) use a longer time series on stock returns on the New York stock exchange, and find effects on risk attitudes and stock holding.

Table 10 shows lifetime experiences of GDP, stock market returns and inflation on Big Five personality traits for the men of the LISS panel. Table 11 shows the same results for the men of the DHS panel. Experienced GDP affects conscientiousness and openness (marginally) for the men in the LISS panel. The effect on conscientiousness is similar to experienced unemployment (GDP and unemployment are negatively correlated), although the effect of experienced unemployment on conscientiousness was previously only found for women. The effect on openness has the opposite sign compared to unemployment. In the DHS panel there is no significant correlation between experienced GDP and Big Five traits, and the only significant effect is on experienced inflation on emotional stability—but

this finding is not corroborated in the LISS panel. The results for women are not reported: in the LISS experienced GDP affects agreeableness and conscientiousness for women, where GDP affects conscientiousness in the same way as with experienced unemployment. For the DHS, there is no correlation between experienced GDP and Big Five traits for women. In the data experienced GDP and experienced unemployment are correlated with a correlation coefficient of  $-0.479$ . Although this correlation is quite high, it leaves room for divergent paths of GDP and unemployment, e.g. “jobless recoveries”. Overall the Big Five personality traits seem relatively more affected by experienced aggregate unemployment than by experienced GDP. However, since GDP and unemployment move together, it is hard to disentangle the two.

Table 10: Big Five, LISS panel, Men, 2008-2014

|                          | Extraversion     | Agreeableness    | Conscientiousness  | Emotional stability | Openness         |
|--------------------------|------------------|------------------|--------------------|---------------------|------------------|
| Experienced GDP          | 0.042<br>(0.25)  | 0.431<br>(0.28)  | -0.551**<br>(0.25) | -0.055<br>(0.24)    | 0.448*<br>(0.27) |
| Experienced stock market | 0.029<br>(0.04)  | 0.066<br>(0.04)  | -0.050<br>(0.04)   | 0.006<br>(0.04)     | 0.039<br>(0.04)  |
| Experienced inflation    | -0.408<br>(0.31) | -0.180<br>(0.37) | 0.021<br>(0.35)    | 0.003<br>(0.33)     | -0.457<br>(0.35) |
| Mean dependent variable  | -0.008           | -0.369           | -0.095             | 0.204               | 0.122            |
| N individuals            | 5069             | 5069             | 5069               | 5069                | 5069             |
| N observations           | 13514            | 13514            | 13514              | 13514               | 13514            |

Table 11: Big Five, DHS panel, Men, 2005-2015

|                          | Extraversion     | Agreeableness    | Conscientiousness | Emotional stability | Openness         |
|--------------------------|------------------|------------------|-------------------|---------------------|------------------|
| Experienced GDP          | -0.987<br>(0.74) | -0.104<br>(0.80) | 0.301<br>(0.87)   | -0.181<br>(0.64)    | 0.682<br>(0.82)  |
| Experienced stock market | 0.035<br>(0.08)  | 0.018<br>(0.10)  | 0.156<br>(0.11)   | -0.020<br>(0.08)    | 0.085<br>(0.10)  |
| Experienced inflation    | -0.147<br>(0.47) | 0.307<br>(0.49)  | -0.332<br>(0.52)  | -0.885**<br>(0.41)  | -0.154<br>(0.51) |
| Mean dependent variable  | -0.016           | -0.288           | -0.070            | 0.208               | 0.076            |
| N individuals            | 2557             | 2557             | 2557              | 2557                | 2557             |
| N observations           | 5867             | 5867             | 5867              | 5867                | 5867             |

Each row represents a separate regression. All regressions include the following variables: individual fixed effects, year dummies, age and age squared partner, city, education dummies, dummies for occupation status, and the presence of children in the household. Standard errors are clustered at the level of the individual. \*/\*\*/\*\* correspond to 10%/5%/1%.

### 3.5 Risk attitudes

Given that Malmendier & Nagel (2011) find that experienced stock market experiences affect risk taking and stock holding in the United States, I now use risk attitudes as an outcome variable. Risk attitudes is only consistently surveyed in the DHS in every wave, and is mainly geared towards attitudes over financial risk. The first three columns in Table 12 show the effect of experienced GDP on self-reported financial risk. The last three columns show the effect of experienced unemployment on financial risk. The results are inconclusive: for women higher experienced GDP increases risk-taking, whereas for men there is no effect. For experienced unemployment the results are opposite: for men less experienced unemployment is associated with more risk-taking, but not for women. Although inconclusive, the coefficient on experienced GDP is twice the size of the coefficient on experienced unemployment. The age profiles are very similar to the ones reported in Dohmen, Falk, Golsteyn, Huffman, & Sunde (forthcoming), who use the same DHS data. When experienced GDP is replaced with experienced stock market returns as in Malmendier & Nagel, none of the coefficients is statistically significant. A possible explanation is that the stock market return series I use is much shorter than theirs, and does not include the years of the Great Depression. Ampudia & Ehrmann (2014) replicate the Malmendier and Nagel study for the Eurozone—including the Netherlands—and do find that experienced stock market returns affect risk aversion and stock holding.

Table 12: Financial risk attitudes, DHS panel, 2005-2015

|                          | All                 | Male                | Female            | All                 | Male                | Female           |
|--------------------------|---------------------|---------------------|-------------------|---------------------|---------------------|------------------|
| Experienced GDP          | 0.543<br>(0.33)     | 0.244<br>(0.47)     | 0.924**<br>(0.45) |                     |                     |                  |
| Experienced unemployment |                     |                     |                   | -0.143<br>(0.18)    | -0.440*<br>(0.24)   | 0.221<br>(0.25)  |
| Age/10                   | -2.241***<br>(0.68) | -5.076***<br>(0.53) | -0.887<br>(0.63)  | -2.158***<br>(0.71) | -5.329***<br>(0.54) | -0.013<br>(0.57) |
| Age/10 squared           | -0.011<br>(0.01)    | -0.012<br>(0.01)    | -0.006<br>(0.01)  | 0.004<br>(0.01)     | 0.007<br>(0.01)     | -0.001<br>(0.02) |
| Adjusted R <sup>2</sup>  | 0.023               | 0.024               | 0.023             | 0.022               | 0.025               | 0.022            |
| Mean dependent variable  | 0.000               | 0.186               | -0.222            | 0.000               | 0.186               | -0.222           |
| N individuals            | 5932                | 3043                | 2892              | 5932                | 3043                | 2892             |
| N observations           | 22091               | 12032               | 10059             | 22091               | 12032               | 10059            |

All regressions include the following variables: individual fixed effects, year dummies, age and age squared partner, city, education dummies, dummies for occupation status, and the presence of children in the household. Standard errors are clustered at the level of the individual. \*/\*\*/\*\* correspond to 10%/5%/1%.

### 3.6 Locus of control and self-esteem

As an extension, two other personality traits are available: locus of control and self-esteem. Locus of control is only measured in the DHS, and self-esteem is only measured in the LISS panel. Both locus of control and self-esteem are important for educational choices and labor market outcomes (e.g. Coleman & DeLeire, 2003; Cobb-Clark & Schurer, 2013; Cobb-Clark, 2015 for locus of control, and Drago, 2011 for self-esteem). Similarly to

earlier analysis, the regressions are split by gender.

In Table 13 experienced unemployment has a positive, and sizable effect on the locus of control of males. A one percentage point increase in experienced unemployment increases the external locus by 0.48 of a standard deviation. Although the effect has the same sign as the Big Five traits and is of similar magnitude, the point estimate is only significant at 10%. For self-esteem there is no noticeable effect, neither for men or for women.

Table 13: Locus of control and self-esteem

|                          | Locus of control    |                    |                   | Self-esteem       |                    |                 |
|--------------------------|---------------------|--------------------|-------------------|-------------------|--------------------|-----------------|
|                          | All                 | Male               | Female            | All               | Male               | Female          |
| Experienced unemployment | 0.360*<br>(0.20)    | 0.481*<br>(0.28)   | 0.270<br>(0.29)   | 0.193<br>(0.17)   | 0.099<br>(0.24)    | 0.336<br>(0.23) |
| Age/10                   | 0.707<br>(1.25)     | 4.282***<br>(0.50) | -1.453<br>(1.80)  | -0.289*<br>(0.15) | -0.452**<br>(0.18) | 0.001<br>(0.28) |
| Age/10 squared           | -0.031***<br>(0.01) | -0.029**<br>(0.01) | -0.032*<br>(0.02) | 0.021**<br>(0.01) | 0.026*<br>(0.01)   | 0.017<br>(0.01) |
| Adjusted R <sup>2</sup>  | 0.004               | 0.006              | 0.002             | 0.010             | 0.012              | 0.009           |
| Mean dependent variable  | -0.000              | -0.013             | 0.014             | -0.000            | 0.099              | -0.085          |
| N individuals            | 5571                | 2840               | 2734              | 11031             | 5062               | 5973            |
| N observations           | 15309               | 8121               | 7188              | 29293             | 13501              | 15792           |

Locus of control is only available in the DHS, self-esteem only in the LISS. The rows for men and women are separate regressions, following the same specification as the top panel. All regressions include the following variables: individual fixed effects, year dummies, partner, city, education dummies, dummies for occupation status, and the presence of children in the household. Standard errors are clustered at the level of the individual. \*/\*\*/\*\* correspond to 10%/5%/1%.

### 3.7 Past or present labor market conditions

As a final robustness check, I employ different weighting schemes. The current weighting scheme of equation (2) sets  $\lambda = 0$ , which gives equal weight to all years of experienced unemployment. Malmendier & Nagel (2011) estimate  $\lambda$  from the data in their application. This is not feasible in this study, because a longer time series of the data is needed to jointly estimate  $\lambda$  and the main regression—both the DHS and the LISS panel have a relatively short time series dimension. Instead, I show results of a specification with  $\lambda = +1$ , which gives more weight on recent unemployment experiences—the weights are increasing from  $k = 1$  to  $age - 1$ . A second specification is  $\lambda = -1$ , which gives more weight on experiences early in life—this the value Malmendier & Shen (2015) use.

The top panel of Table 14 reports the main results from Table 8 for comparison. Both specifications pick up some of the results of the main specification, but it is difficult to detect a pattern over the three specifications. In the specification with  $\lambda = +1$ , the signs of most personality traits are opposite, and the coefficient size is small—except for conscientiousness. However, experienced unemployment affects conscientiousness mainly for women. In the specification with  $\lambda = -1$ , most coefficients are close to zero, except for agreeableness, which is marginally significant at 10%. My preferred specification gives equal weight to all years of experienced aggregate unemployment.

Table 14: Different weighting schemes, LISS panel, 2008-2014

| All  | Extraversion     | Agreeableness    | Conscientiousness  | Emotional stability | Openness         |
|--|------------------|------------------|--------------------|---------------------|------------------|
| Experienced unemployment<br>$\lambda = 0$  | 0.135<br>(0.11)  | 0.263*<br>(0.14) | 0.290**<br>(0.13)  | 0.231*<br>(0.13)    | 0.014<br>(0.13)  |
| Experienced unemployment<br>$\lambda = +1$ | -0.005<br>(0.09) | -0.014<br>(0.11) | 0.258***<br>(0.10) | 0.082<br>(0.10)     | -0.060<br>(0.11) |
| Experienced unemployment<br>$\lambda = -1$ | 0.043<br>(0.06)  | 0.176*<br>(0.09) | 0.090<br>(0.06)    | -0.001<br>(0.07)    | 0.030<br>(0.07)  |
| Mean dependent variable                    | -0.000           | 0.000            | -0.000             | 0.001               | 0.000            |

The top panel reports the same regression results as in Table 8. All regressions contain 29,319 observations for 11,044 individuals (unbalanced panels). All regressions include the following variables: individual fixed effects, year dummies, age and age squared partner, city, education dummies, dummies for occupation status, and the presence of children in the household. Standard errors are clustered at the level of the individual. \*/\*\*/\*\* correspond to 10%/5%/1%.

## 4 Discussion

One concern for the reported findings is the issue of measurement error. Over short periods of time, changes in personality are typically small—a finding I replicate in section 3.2. Measurement error is mentioned as a concern by Lee & Hotopf (2005), and Cobb-Clark & Schurer (2013) for locus of control. Even if personality traits are measured with error, I have reason to believe that the main findings will uphold. First of all, the main results are found in two independent samples, which differ in their composition of panel members. Second, similar results are found for different time periods, the DHS panel spans ten years (2005-2015), and the LISS panel six, with more waves in this period. Thirdly, the main regressor—experienced aggregate unemployment—is not affected by measurement error, and the effect of aggregate unemployment on personality traits shows stable patterns.

Another issue is whether the results are causal or correlations. It is clear that personality traits cannot affect experienced aggregate unemployment, but there could be a third factor influencing both. This variable has to be time-varying, since the panel data models contain individual fixed effects and time fixed effects. It is difficult to think of a variable that affects a macroeconomic variable like aggregate unemployment and individual personality traits at the same time. Moreover, different cohorts have different profiles of experienced aggregate unemployment—in the same year younger cohorts can have an increasing profile and older cohorts a decreasing profile (or vice versa). And even if there is variable that influences both unemployment and personality traits, this would still be a macro variable systematically affecting personal traits.

## 5 Conclusions

Non-cognitive skills, and personality traits in particular, are seen as important predictors of success in the labor market (Borghans, Duckworth, Heckman, & Ter Weel, 2008; Gensowski, 2014; Rustichini, DeYoung, Anderson, & Burks, *forthcoming*). This study shows evidence for the reverse: experienced aggregate unemployment affects the level of personality traits, as well as changes. Higher levels of experienced unemployment negatively affect almost all Big Five personality traits, except for conscientiousness. This results is similar to findings that adverse personal events have a negative impact on personality traits (Cobb-Clark & Schurer, 2012). However, it is not only the level, also changes in Big Five personality traits are systematically related to past labor market conditions. Here the interesting result is that a worsening in experienced labor market environment increases emotional stability and agreeableness for men, and conscientiousness for women. This suggests that an increase in bad labor market conditions, “sharpens” certain personality traits for the better. Macroeconomic experiences not only affect beliefs and risk attitudes, but also personality traits as the Big Five, and to some extent locus of control.

## Appendix A

Survey instrument Big Five in the DHS and LISS. The order of the questions is different between the two surveys. Answers are rated on a five point scale from 1 (very inaccurate) to 5 (very accurate).

1. I do chores right away
2. I leave my things lying around.
3. I live my life according to schedules
4. I neglect my obligations
5. I have an eye for details
6. I am accurate in my work
7. I forget to put things back where they belong
8. I am always well prepared
9. I often make a mess of things
10. I like order
11. I am the life of the party
12. I feel little concern for others
13. I get stressed out easily
14. I have a rich vocabulary
15. I do not talk a lot
16. I am interested in people
17. I am relaxed most of the time
18. I have difficulty understanding abstract ideas
19. I feel comfortable around people

20. I insult people
21. I worry about things
22. I have a vivid imagination
23. I keep in the background
24. I sympathize with others feelings
25. I seldom feel blue.
26. I am not interested in abstract ideas.
27. I start conversations
28. I am not interested in other peoples problems.
29. I am easily disturbed
30. I have excellent ideas.
31. I have little to say
32. I have a soft heart
33. I get upset easily
34. I do not have a good imagination
35. I talk to a lot of different people at parties
36. I am not really interested in others
37. I change my mood a lot
38. I am quick to understand things
39. I do not like to draw attention to myself
40. I take time out for others
41. I have frequent mood swings
42. I use difficult words
43. I do not mind being the center of attention
44. I feel others emotions
45. I get irritated easily
46. I spend time reflecting on things
47. I am quiet around strangers
48. I make people feel at ease
49. I often feel blue
50. I am full of ideas

## Appendix C

Survey instrument for self-esteem, only administered in the LISS panel. Questions are answered on a seven point scale from 1 (totally disagree) to 7 (totally agree). The first 10 items is the Rosenberg scale, the last 3 is the Radboud scale.

1. I feel that I am a person of worth, at least on an equal plane with others
2. I feel that I have a number of good qualities
3. All in all, I am inclined to feel that I am a failure

4. I am able to do things as well as most other people
5. I feel I do not have much to be proud of
6. I take a positive attitude towards myself
7. On the whole, I am satisfied with myself
8. I wish I could have more respect for myself
9. I certainly feel useless at times
10. At times, I think I am no good at all
11. I am satisfied with the way I look
12. I feel good about myself
13. I have confidence in my capabilities

## Appendix B

Survey instrument for locus of control, only administered in the DHS. Questions are answered on a seven point scale from 1 (totally disagree) to 7 (totally agree).

1. Saving and careful investing are key factors in becoming rich
2. Whether or not I get to become wealthy depends mostly on my ability
3. In the long run, people who take very good care of their finances stay wealthy
4. If I become poor, its usually my own fault
5. I am usually able to protect my personal interests
6. When I get what I want, its usually because I worked hard for it
7. My life is determined by my own actions
8. There is little one can do to prevent poverty
9. Becoming rich has nothing to do with luck
10. Regarding money, there isnt much you can do for yourself if you are poor
11. Its not always wise for me to save because many things turn out to be a matter of good or bad fortune
12. It is chiefly a matter of fate whether I become rich or poor
13. Only those who inherit or win money can possibly become rich

## Appendix D

Survey instrument for self-reported (financial) risk, only available in the DHS. Questions are answered on a seven point scale from 1 (totally disagree) to 7 (totally agree).

1. 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.
2. I would never consider investments in shares because I find this too risky.
3. If I think an investment will be profitable, I am prepared to borrow money to make this investment

4. I want to be certain that my investments are safe.
5. I am becoming more and more convinced that I should take greater financial risks to improve my financial position
6. I am prepared to take the risk to lose money, when there is also a chance to gain money

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