ERASMUS UNIVERSITY ROTTERDAM

Erasmus School of Economics

Bachelor Thesis International Bachelor Economics and Business Economics

Wealth and wellbeing: inheritance as an estimator of happiness and calmness

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Date final version: 01/07/2018

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Abstract

In this paper, the main aim was to provide additional insight into the relation between the change in wealth and wellbeing. Obtaining more income, enables individual to buy more goods which in return grants him higher utility. Empirical evidence is necessary for confirming such statements. Windfall income namely receiving inheritance, is useful in determining such effect. Two different ideas representing one's wellbeing have been used: self-reported happiness and calmness. The dataset comes from the DNB household survey conducted in between the years 2002 and 2017. For the subsequent analyses, the longitudinal data with fixed effects was used. Analyses, showed that receiving an inheritance did have negative effect on self-reported happiness while on the other, individuals who have benefitted from bequest, have reported to be significantly calmer on average, compared to the non-beneficiaries.

Contents

1. Introduction

The sources of human happiness have been in the interest of the economists for many years. One of the proofs is the ever-increasing number of empirical studies analysing subjective wellbeing (Kahneman & Krueger, 2006)[1]. Nevertheless, there is clearly one underlining factor that held the interest of the researchers the most and that is wealth, namely its change. Even basic intuition from economics suggest that having more money leads to a better wellbeing, since more goods can be acquired. In general, it is believed that having more wealth does make an individual happier. It is no surprise that several research articles have been written to provide valuable insight into such statement. The conclusions vary. On one hand, the increase in one's income does have positive effect on being happy (Gerdtham & Johannesson, 1997). On the other, increase in one's wealth did not significantly affected reported happiness (Kuhn, Kooreman, Soetevent & Kapteyn, 2011). Overall, it is however believed that even though increase in wealth might not increase happiness, the absence/decrease of it does stimulate an unhappy emotion (Myers & Diener, 1995).

The biggest problem in this field, is to establish a causal interpretation. Since income is accompanied by several other aspects, its exogeneity is questionable. The already mentioned research by Kuhn et al. (2011) have used different approach, namely the concept of lottery winnings to estimate the effect of money on happiness. Even though, they have not found any significant relation, other researchers have found out that winning a mid-size lottery does indeed increase happiness of the observed individuals (Gardner & Oswald, 2007). The main aim of this paper is to further analyse the relationship between the income and happiness. Thus, the research question is stated as following:

To what extend does change in wealth affects the individual subjective wellbeing?

Following the previous research, different ideas representing the change in wealth can be used. In this paper, receiving an inheritance will be used as a notion to represent this change. The main reason to use inheritance as opposed to the traditional change in income due to internal factors, is similar as was in the case of the lottery winnings. Both concepts are arguably exogenous, which enables researchers to get more precise causal estimates. At the same time, it is undeniably true that it increases ones' wealth. The idea to use inheritance as

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[1] In the following paper, the terms such as wellbeing, happiness, life satisfaction etc. are going to represent the same concept. More precisely no significant distinctions are made since the belief is that they represent the same idea nevertheless. The same applies to the use of words such as wealth, money, income, etc.

the factor that increases wealth has been already used by previous researchers. Meer, Miller and Rosen (2003), have used this concept in determining the relationship between wealth and health. They argue that the exogenous character is clearly helpful in determining its effect and helps to establish more accurate causal interpretation. Other papers have concluded, that receiving an inheritance did indeed have positive effect on one's happiness, despite the fact that inheritance is connected with the loss of an acquaintance (Gardner & Oswald, 2002).

In the following theoretical framework section, I will present the overview of the literature on the relationship between income and happiness and the hypotheses that have been be tested will be discussed. The data and methodology section will follow, where I will discuss the data used and describe the methodology applied in testing the hypotheses. Afterwards, the results of the analyses will be presented with the appropriate robustness check. In the end, the conclusion as well as interpretation of the results with appropriate discussion will be given.

2. Theoretical framework

Importance in understanding the causal estimators of wellbeing is clearly demonstrated by the findings of numerous empirical studies. Learning about the ways with which we can improve happiness is certainly helpful. Most importantly there are several aspects that happiness affects in return. The most important attribute is namely connected to health. It was found out, that happy people, given that they are healthy, are more likely to live longer. The strength of this effect is as strong as the negative effect of smoking. (Veenhoven, 2007). Besides that, happiness does seem to lead to success. This relates to the fact that happy people are keener to adapt characteristics which enable them such success (Lyubomirsky, King & Diener, 2005). Happy people are also very beneficial for firms. The subjects in the test were provided different items that were known to evoke happy emotions. It was found out that due to these, the productivity rose by approx. 12%. Researchers also looked at the effect of events that had made people unhappy, such as a loss of a close relative. In their case productivity decreased (Oswald, Proto & Sgroi, 2015).

Before analysing the previous research that used inheritance as its control variable representing change in wealth, it is important to review the literature on the different concepts of wealth, that has been used.

2.1 Income and happiness

2.1.1. Overview of the different wealth concepts

It is no surprise, that economists have been interested in the relationship between the economical premise of obtaining higher utility by having larger income and the real-life observations (Frey & Stutzer, 2002). One of the papers, that is considered to be ground breaking in the field of economics of happiness, is written by Easterlin (1974). Before his research, the concept of happiness was primarily connected to psychology and was not analysed in depth by economists. The main aim of his paper was to analyse the relationship between self-reported happiness and the increase in GDP, while focusing on the effect on the aggregate level. Even though, no significant relationship was found, more recent research is contradicting this (Stevenson & Wolfers, 2008). The same premise was used while using the logarithmic function of net income and longer time period was observed. Increase in happiness is subtle, but as they argue it is not really static as was previously suggested by Easterlin. The idea of these two articles has been to look at more aggregate level of changes. However, due to the fact that the happiness is reported by individual themselves, research has primarily focused on causal interaction on micro economical level.

A lot of articles have focused on the change in wealth that occurred through the increase in the individual's income. Paper written by Gerdtham and Johanneson (1997), used the data from the Sweden to analyse this question. The variable representing happiness was measured via the help of categorically set question. Therefore, the ordered probit model has been used. Instead of using income as continuous variable, the income quantiles representative for the given sample were used. Namely four categories were defined with the first quantile being the reference category. As it turned out, on average, being in higher income percentile resulted in being happier. The main issue with this study is that it only answers the question if there is difference between income categories. Specifically looking on the effect of income and ranking in society gained by income has been analysed by Boyce, Brown & Moore (2010). They have indeed found out that the happiness has only increased if the increase in the income was accompanied by entering a new ranked income position. This indicates that solely looking at the increases of the one's income is not sufficient and different results can occur. It is namely the concept of reference category and relative income that is important (Stutzer, 2004; Caporale, Georgellis, Tsitsianis & Yin, 2009). Now these concepts focused on more endogenous factors. Increasing income can be accomplished by individual's hard work which results in the given increase in success. However, if we look at the question does the money

bring happiness, clearly endogeneity of previously mentioned concepts creates an issue (Frey & Stutzer, 2002). In order to get the true effect of money on one's life satisfaction more exogenous sources have been used. One of such are lottery winnings.

Using lottery winnings enables us to estimate direct effect of the money since this event is more unanticipated. In other words, more exogenous. So, are the outcomes any different? Well, literature on this is diverse. The concept to use lottery winnings instead of changes in incomes has been examined by Gardner and Oswald (2007). In their analysis, they have used the data on the sample whose lottery winners have received amounts between 1 000 £ to 120 000 £. The mental wellbeing of the lottery winners was found to be significantly higher two years after obtaining the lottery prize than compared to the pre-winning state. Very similar outcome has been found out by Apouey & Clark (2015), who took inspiration from Gardner and Oswald. As Gardner and Oswald, they analysed the effect of income on both general and mental health. Since questions concerning mental health incorporated questions about life satisfaction, in addition to their primary analysis, they used their model to estimate the effect on the subjective wellbeing. It was estimated that the happiness significantly increased due to positive income shocks in the form of lottery winnings. More recent research written by Kuhn et al. (2011), has found different outcome. In their analysis, they have used Dutch post lottery, which selects a random household based on their postal code. Due to this very similar living blocks could have been compared and the assumptions of randomized experiment setting could have been applied. Interestingly, they have found out that the increase in income did not stimulate any significant effect on self-reported happiness. What changed was the behaviour of the neighbours, since they felt to follow the increased spending behaviour of the lottery winners.

The main criticism that was used regarding the previously mentioned articles was that the people who participate in the lotteries are already considered to be more risk seeking. With this a lot of unique characteristics traits are connected and thus interpretation on the general population might be incorrect. Because of these issues economists tried to use different approximations for this phenomenon. Receiving an inheritance is one of them.

2.1.2. Previous studies using inheritance as approximation of the change in wealth

As was discussed in the introduction, the research question is to look at the effect of receiving inheritance on one's self reported happiness. One of the reasons, why lottery winnings were discussed so extensively is that receiving an inheritance and winning a lottery are in lot of articles factors that are clustered together. The concept used is referred to as

windfall income. The main advantage of using windfall income is that it is more exogenous than compared to the typical changes in wealth through means such as increase in earnings. It is more external and such a trait is very useful in determining the causal interpretation (Meer et al., 2003).

In this research, written by Meer et al. (2003), the main aim was not directly estimating the effect on happiness but the effect of wealth on health. Their conclusions are important since the relationship between health and happiness is very closely intertwined (Diener & Chan, 2011; Guo & Hu, 2011). Meer et al. has found out that change in wealth does have significant positive effect on health. However, the effect has been found to be very small and after applying stronger causal method, namely using IV-regression, the effect was not significantly different from zero. Even though, they argued that receiving and inheritance is considerable exogenous, in the article possible limitations of using such concept are outlined. Usually individual receives inheritance after an acquaintance of his has passed away. This negative event might offset the positive effect of receiving the additional sum of money and it is clearly damaging the causality of using inheritance as an estimator. Besides that, it might not be unanticipated that one receives inheritance therefore his consumption behaviour and other socio-economic factors might change. This will further decrease the causality of the analysis. Nevertheless, it is a useful estimator as the following paper shows.

Despite the conclusions made by Meer et al. (2003), research conducted by Gardner and Oswald (2002), has come to different findings. In this paper, it was clear goal to observe relationship between money and reported happiness. The main aim was to get the best causal estimate as possible therefore the windfall money (lottery and inheritance) was used as the estimator of the change in wealth. The analysis made use of different statistical methods ranging from simple multiple regression, ordered probit up to longitudinal data analysis. Two different variables are used to represent the wellbeing: mental stress and unhappiness. These two concepts have been measured via the help of the General Health Questionnaire (GHQ) score. Conclusions of the research indicate that while using either lottery winning or inheritance, there is clear significant positive relation between money and happiness.

Overall, use of inheritance as the predicator of the change in wealth is useful. Even though, inheritance might be accompanied by other factors, it is no doubt that it is very close to representing randomized money transfer and thus using it for causal interpretation is appealing (Gardner and Oswald, 2002). The main goal of this paper is to add the additional insight into the relationship between income and happiness. As Ferrer-i-Carbonell and Frijters (2004) have mentioned, previous research has mainly used OLS regressions and probit

models to observe the discussed relationship. However, because OLS is very vulnerable to omitted variables the causal interpretation is lacklustre. Therefore, as is even suggested, the individual fixed effects are implemented in the concluding analysis of this paper. Ferrer-i-Carbonell and Frijters (2004) argue that using this method, more accurate results are obtained. And thirdly, since wellbeing is without a doubt a very subjective matter, different estimators for the happiness have been used. These will be further discussed in the data and methodology section.

2.2 Hypotheses

In order to obtain answer for the central question, different hypotheses have been estimated. The first hypothesis is the following

Hypothesis 1: *Receiving an inheritance has significant positive effect on self-reported happiness*

Following the previous discussion, changes in wealth seem to significantly effect one's wellbeing. Despite the different outcomes of mentioned articles, it is generally believed that life satisfaction increases with more money (Frey & Stutzer, 2002).   Therefore, the same expectation is represented while using inheritance principle. Besides that, research by Gardner and Oswald (2002) has clearly shown that such outcome is observable. Overall, the main premise of this hypothesis comes from the traditionally concept of utility. As neoclassical economists have outlined, individual's aim is to maximize his own utility while respecting his own budget constraint. Obtaining more money does indeed allow the given individual to obtain more goods which in return result in higher utility (the higher indifference curve can be obtained).

The second hypothesis that will be tested is the following:

Hypothesis 2: *Receiving an inheritance has significant positive effect on self-reported feeling of calmness and peacefulness*

The hypothesis follows the same logic as is presented by permanent income hypothesis (Friedman, 1957). As Friedman argues, that as individuals, we aim to distribute our consumption throughout our lives proportionally. Since consumption patterns rely heavily on one's future expectations, many individuals are more likely to add this bonus income into their saving accounts. Therefore, receiving additional money through inheritance might

stimulate more stress relieving emotions, since no immediate purchase of goods will occur. Empirical evidence on this also shows that marginal propensity to consume from the windfall money was smaller than from the regular income (Kreinin, 1961). This clearly indicates that the money is more likely to be saved. From more technical point of view, the idea behind this hypothesis also stems from the availability of different outcome variables. Measuring happiness is difficult and as previous research showed different measurements have been used to produce different conclusions. Thus, if these different concepts of wellbeing are available their addition is clearly helpful in gaining more precise causal interpretation. With the theory set in place, the data and methods used can be discussed.

3. Data and methodology

The data that has been used for the analysis has been gathered from the DNB Household Survey administered by *CentERdata*. Every year, since 1993, *CentERdata* conducts a survey that is sent to several households located in Netherlands. Furthermore, in the surveys, six sub-categories are defined ranging from general information, wealth, health, work, assets, income up to topics concerning psychological aspects such as mood, personality traits, etc. The main advantage of the database is that most households that participate in the survey are same throughout the years. This is very useful since it enables the possibility to use more complicated statistical methods.

For the research purposes, the surveys conducted from 2002 up to 2017 have been used. Through the years, the surveys have changed. Namely there have been added several new questions but also the text and possible answer options for already established questions have been altered. However, the questions from which information has been used for the analysis, have not been changed through the observed time period. This means that phrasing of the questions and answers to the specific questions have stayed the same. Thus, it should be unlikely that the individuals who participated in multiple of the surveys could have understood the questions differently. Regarding the selection process of the individuals for the research, only individuals who are older than 18 years have been included in the analysis. This is simply because from the legal standpoint individuals younger than 18 years old would not receive the inheritance directly. Thus, their addition is questionable and their elimination helps to eliminate this problem. Another step in selecting the sample, was that individuals have participated in the survey every year. The reason for that is technical, since the model is using individual fixed effects and therefore consistency of answers through the years is important. Thirdly, if there were missing values for any of the used variable, such

observation was deleted. Since missing values are truly random and it was only due to the fact that individuals have not answered them, their exclusion does not limit the interpretation of the results.

As already mentioned the individual fixed effects model has been used for the analysis:

$$Y_{it} = \beta_0 + \alpha_i + \beta\, T_{it} + \gamma X_{it} + l + \varepsilon_{it} \qquad\qquad i = 1, \dots, n$$
$$t = 1, \dots, T$$

In the equation, Y is the dependent variable, which represents the self-reported wellbeing. Since two hypotheses are being observed, that means both the happiness and calmness are considered dependent variables; β_0 indicates the respective constants; α captures all the individual specific characteristics or in other words all the time-invariant variables. Due to the fact that within estimator is being used, these time invariant individual specific variables drop out; control variable T is representing the dummy and the amount of received inheritance; other time-variant variables such as age, net income, etc. are captured by X. Error term ε represents all the unobserved time-variant effects and the random errors (residual);variable l captures the trend and appropriates it to the respective years; index i is representing specific individual and index t represents respective time period. Following the discussion about different concepts of wealth, it is important to discuss how used variables were measured.

The individual subjective wellbeing has been interpreted from two questions in the survey. First question asked in the survey about one's happiness is represented in *figure 3.1:*

All in all, to what extent do you consider yourself a happy person?
1 very happy ....
2 happy ....
3 neither happy nor unhappy ....
4 unhappy ....
5 very unhappy..
-9 don't know ....

Figure 3.1.: First type of question on reported subject wellbeing

The values, representing the individual's response that they do not know, have been determined to be missing, since it is not adding any additional insight. On top of that, only few individuals have chosen such option. This type of measurement has been used in the past and it is categorized as General Satisfaction level of the respondent (Ferrer-i-Carbonell and Frijters, 2004). A similar approach, in measuring one's happiness has been done in research

written by Van der Meer & Wielers (2015). In their research, the same source of data is used namely the LISS panel data, which is also administered, as DNB household survey by *CentERdata*. The same five categories and question have been used. The main difference is that in the case of this paper, the assumption of categorical variable is not used. Instead it will be interpreted as continuous variable, despite the clear characteristics of ordered categorical variable. The reason for that is namely due to the method used and easier interpretation. Interpreting Likert-scale as an interval one, has some problems, but it does not limit the analysis significantly (Labovitz, 1967). Since five options are present they can be interpreted as scores and therefore positive coefficients means higher probability to report being happy.

The second type of questions about ones' wellbeing, is represented in *figure 3.2*. The clear difference between the *figure 3.1* and *figure 3.2,* is the different range of possible answers. Still it is only a different Liker-scale with occurrence ratings used. Therefore, what was said

The following questions are about how you felt over the past month.
For every question, please choose the answer that best describes how you felt during this past month.

This past month ....

1 never
2 seldom
3 sometimes
4 often
5 mostly
6 continuously

I felt very anxious ....

I felt so down that nothing could cheer me up..

I felt calm and peaceful...

I felt depressed and gloomy...

I felt happy..

Figure 3.2.: Second type of question on reported subject wellbeing

about *figure 3.1,* the same is applied here. The outcome variable is continuous again. Now in the question, specific importance is put on the emotions experienced in the past month. This is important to discuss. The surveys conducted are usually in between April and October. Moreover, the question about inheritance is stated did you received inheritance in the past year. There is no clear specification in which month it occurred. Therefore, the distance between the participants' answer and the event of receiving inheritance, can be up to one year. Therefore, it can be questionable if the inheritance has any effect on such reported happiness.

Despite that, research shows that emotions, in the case of strong life event, are experienced for a long time after that. (Zisook & Shuchter, 1991). Thus, using this specific

interpretation of wellbeing can only be added benefit. As stated, there are two hypotheses. First one is using the measurement of happiness from both questions. The second hypothesis, regarding one's calmness is using information gathered only from the question represented in *figure 3.2*. Besides that, the second type of questions was used in the survey since 2013 therefore the answers are only observable, using the representation of *figure 3.2.*, for period 2013-2017.

The control variable of receiving inheritance is represented by two measurements. One is representing the binary variable either the person has received inheritance in the past year or not. Value 0 is for no and 1 is for yes. The other is the logarithmic function of received amount of inheritance. The reason for using logarithmic function is that after observing respective histogram, there was clear case of skewness. Using logarithmic function enables to minimize this skewness and assures that assumption of normal distribution holds. Other independent variable are age and net income. Age represents individual's age which is continuous variable.

Reasoning to use age is more informative since age is usually considered a standard variable to include in many models. On top of that, no additional changes were necessary since age was reasonably normally distributed (*figure 3.3)*. Reason to include income is straightforward; it is often used when the relationship between change in wealth and wellbeing is analysed, as was demonstrated by previous research (Stevenson & Wolfers, 2008). As with amount of bequest, logarithmic function of net income was used due to the skewness that is often connected with income and is clearly transparent from the *figures 3.4. and 3.5.* Simply put net income represents all the values of income that are both positive and negative. That means loans, earnings, etc. are input variable in calculation of the net income.[2] This is useful since it enables us to get a more representative picture of the financial state of the observed individual. Besides that, since the formula of net income also adds inheritance, it was subtracted to prevent any misinterpretations (issues of collinearity)

Any monetary values have been adjusted for inflation with the reference year 2015[3]. This was done, since it enables more accurate comparisons between the values in different years. All the monetary values are presented in euros. Besides that, since logarithmic function was used, individual observations with net income smaller than zero were deleted because naturally logarithmic function could not have been applied for such values. In the case of the

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[2] For further answers to the question, how is the net income calculated, please refer to the DNB household survey codebook for respective year, where the formula for the calculation is present.
[3] The CPI values have been gathered from the dataset of *CBS*

amount of inheritance, a transformation has been made. Instead of having zero values in the case individual have not received any inheritance, it was replaced with the value 0.00000001. This way logarithmic function could have been applied and the information that the value received was zero was not lost. Robust standard errors were used in order to account for possible heteroskedasticity, which could make the calculation of the standard errors incorrect.

3.1 Descriptive statistics[4]

The integral part of any analysis is the overview of the database. Even though the same database for answering both of the hypotheses is being used, the characteristics of the participants are different since different time periods are being used. Firstly, observations from 2002 till 2017 are discussed (*Table 3.1 – 3.9.)* and after that the observations from the period 2013-2017 are described (*Table 3.10 – 3. 22.)*

The average age of people who responded throughout the years 2002 and 2017 is 56 years. The mean net income is estimated to be 27 979, 96€ (Table *3.1).* As it can be seen from *Table 3.2.*, 315 individuals have reported to receive inheritance in the observed period which represents 5,01% of the sample. This is expected since as discussed, inheritance is not a very common event. Both males and females are present in 40:60 ratio (*Table 3.3)*. The average amount of the received inheritance is 21 824,86€ with the median value of 4 984.05 € *(Table 3.4*). On top of that, the amounts were in between 272, 67€ and 706 880,3€. The main importance is to look at the differences between treatment and control group. It is apparent that the differences are clearly present. The mean net income for those who received inheritance is 32 339,81 € (*Table 3.5)* and for those who did not 27 750,07€ (*Table 3.6.)*. Even the median values show a difference of 4 589,74€. In addition to that, the percentages of people who reported to be happy or very happy are 88,89% (*Table 3.8.*) and 84,65% (*Table 3.9.)* for beneficaries and not, respectively. Overall, the large majority in the sample reported to be either happy or very happy (*Table 3.7.*). Correlations between the variables are represented in table 3.5. Both dummy and amount variable for inheritance, exert negative correlation with the self-reported wellbeing. This indicates negative relation but more analysis is needed to determine that (*Table 3.10.*).

The average age of the second sample, representing the period 2013-2017, is 59 years and the average net income is 25 574, 98€ (*Table 3.11.*). Again, the representation of males and females is representing the approximate 40:60 ratio (*Table 3.13.*). In the case of this sample, 236 individuals have received inheritance while 4 131 did not (*Table 3.12.*). The amounts

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[4] Respective descriptive statistics tables can be found in the Appendix

received ranged from 150€ up to 300 000€, with the average and median amounts, 15 074,61€ and 5000€ respectively (*Table 3.14.*). The differences between those who received inheritance and not are also present in this sample. However, the values are very similar to the previous sample. Beneficiaries' average net income is 28 025,38€ (*Table 3.15.*) while the others average income is 24 540,7€ (*Table 3.16.*). Looking at the two strongest options for measurement of happiness, mostly and continuously, cumulative percentages respectively for bequeathed and not are 51,7% (*Table 3.19.*) and 57,62% (*Table 3.20.*). As stated previously, another observed emotion is calmness. In both cases, the largest number of attributes was given to the option mostly, with 47,03% (*Table 3.21.*) and 48,29% (*Table 3.22.*) respectively. Receiving inheritance has positive correlation with both happiness and calmness. On the other hand, amount received has negative correlation with both dependent variables. Naturally, correlations are useful estimators in observing the relation between two variables (*Table 3.23 & Table 3.24.*). However, correlation does not prove causality and therefore in the following section, results of the causal analysis are shown.

4. Results[5]

Referring to the previous statements, the main aim of this thesis is to provide additional insight into the relationship between wealth and life-satisfaction. As already outlined the individual fixed effects analysis was used. The following section is separated into two parts. Firstly, the models for *hypothesis 1* are discussed and after that the models analysing *hypothesis 2* using calmness are analysed.

First hypothesis, predicts that receiving additional income from inheritance does have positive significant effect on self-reported happiness. To conclude either the hypothesis is accepted or rejected, different models were estimated. In the table 4.1. the basic model only using the discussed control variables is presented. The sample used in this model is from 2002-2017. On average people, who receive inheritance report 0.654 lower score than individuals who have not received anything, ceteris paribus[6]. However, the effect is only significant using the significance level 10%, therefore the effect should be treated with caution. Looking at the *Model 2*, 10 % increase in the amount of the inheritance decreases the reported wellbeing score by 0.00024. Again, the effect is only significant at 10% level, which is not very convincing. The result of the analysis using the sample from 2013-2017 and the

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[5] The interpretation of the constant term is not made since it is never the case that other variables are equal to zero, more precisely the age of individuals is at least 18 years.

[6] In all the following interpretations of the coefficients and their p-values, the ceteris paribus clause is always applied, if not stated differently.

different measurement of happiness, is also presented in the table *4.1*, under the notion of *Happy 1* and *Happy 2*. Beneficiaries on average, compared to non-beneficaries, report a higher score by 0.062 but the effect is not significant for any common significance level. A 1% increase in amount of inheritance does not yield any significant changes to reported happiness. Therefore, using the different measurement of happiness, no clear significant relation has been found, at least according to this model

The second hypothesis, analyses different emotion namely calmness. It is expected that even in this case windfall income will show a significant positive effect on reported calmness. The results of the model can be viewed in the *Table 4.1* under the notion *Calm 1* and *Calm 2*. Significant differences can be found. People who have received inheritance, on average, report higher score of calmness by 0.134 compared to non-beneficiaries. This effect is significant also for 5%. Similar story follows for amount of inheritance. The coefficient is significant for 5% level and the 10% increase in the amount received increases reported score and thus achieving higher calmness by 0.00051. From these basic models, it seems that with more amounts received from inheritance, reported happiness is lower while self-reported

Table 4.1.: Fixed effect regression results for the relationship between receiving inheritance/ amount of inheritance and happiness/calmness[7]

Legend: Coefficient/ Robust Std. Errors/ P>|t| Variables	Happines 1	Happines 2	Happy 1	Happy 2	Calm 1	Calm 2
Dummy Inheritance						
Yes	-0.0654		0.0621		0.1398	
	-0.0351		-0.0525		0.0651	
	0.063		0.237		0.032	
Net income	-0.0107	-0.0107	-0.0308	-0.0308	-0.0007	-0.0007
	0.0127	0.0127	0.0218	0.0218	0.0241	0.0241
	0.402	0.402	0.158	0.158	0.976	0.977
Inheritance amount		-0.0024		0.0023		0.0051
		0.0013		0.0019		0.0024
		0.060		0.236		0.030
Constant	2.4373	2.3939	3.4590	3.5007	3.8876	3.9814
	0.2212	0.2221	0.5446	0.5453	0.5418	0.5400
	0	0	0	0	0	0
# of individuals	611	611	1 246	1 246	1 246	1 246
Total # of observations	6 289	6 289	4 367	4 367	4 367	4 367
F-test	4.75	4.75	2.45	2.44	2.72	2.73
Prob > F	0.0000	0.0000	0.0235	0.0240	0.0126	0.0122

[7] In the model additional control variables are included namely, age and year (categorical variable that capture the yearly trend of the reported outcome variable). Net income represents the logarithmic version of the net income. Same applies to the inheritance amount variable

calmness increases. However, as with any analysis it is important to control for different transformations and thus robustness check is essential.

4.1. Robustness check[8]

It is only logical to assume that different inheritance amounts have different effects. Using normative approach to evaluate the amount of inheritance, can subjugated the significant relation that can occur only because of higher inheritance amounts. Creating specific categories for different amounts, enables to distinguish such effect. Categorical variables for respective inheritance amounts categories have been created. Three distinct categories are: 250€ – 4 500€, 4 501€ - 9 500€ and amounts higher than 9 500€.The use of such robustness check is also supported by previous empirical studies were different significant relations has been found due to this separation using similar categorical approach (Gardner & Oswald, 2002). The results of this approach for respective sample can be seen in *Table 4.2*.

For the first sample, no significant effect compared to those who have not received inheritance has been found for lower two categories. However, if inheritance amount was higher than 9 500€, negative effect on reported happiness can be found. Even though the effect is significant only at 10% level, on average, individuals who have received more than 9 500€ have reported a score lower by 0.067, compared to those who have not received anything. Looking at the second sample (*Happy 3*) neither category seems to show any significant effect on reported happiness therefore it is not appropriate to assume that there are any significant differences compared to non-beneficiaries. In the case of calmness, it seems that receiving amount above 9 500€, does have significant positive effect of 0.196 on reported score of calmness compared to the reference category of receiving nothing. The significance is only assumed for 10% significance level. It seems that making distinct categories does seem to follow the interpretation concluded from the basic models, while the highest category of 9 500€+ having the most significant impact.

In general, the effect of change in wealth clearly depends on what is our current income level. Reference category is important concept and as *Prospect theory* shows, receiving 1 000€ will have different impact on individuals with lower and higher incomes. Therefore, it is important to see if there are any differences for such income categories. Besides the theoretical reasoning, different empirical studies have found out, that the respective income categories are important (Stutzer, 2004; Caporale et al., 2009; Boyce et al., 2010). In order to have representative categories, the categories were distributed into income quantiles. Since

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[8] Tables for respective robustness checks are presented in the Appendix

the interest is in the interaction between the inheritance and the income category, the interaction term with the respective dummy variable for inheritance was estimated.

As it can be seen from *table 4.3,* the effect of inheritance is significantly negative on the reported wellbeing, which was also shown by the previous models. This time however, it is significant for significance level of 5%. The interaction term seems to show significant effect for 10% level when the interaction occurs for third and fourth quantile. It seems that being in the third income quantile and receiving inheritance increases the reported wellbeing score by 0.146. Looking at the interaction between being in the fourth quantile and receiving inheritance, the reported score is higher by 0.158. Despite the positive effects, it is important to account for all coefficients that are present besides the interaction terms to really get the impression of the reported score. In both cases, the total coefficient is negative namely -0.0116 and -0.0269. So overall, the negative effect on reported happiness is preserved. In the case of the second sample, using the different measurement of happiness, no significant result has been found even after controlling for this interaction. Lastly, using calmness as the dependent variable, the inheritance still shows significant positive effect on reported score of calmness. More precisely those, who have received inheritance, report on average a higher score of calmness by 0.297 compared to those who did not. None of the interaction terms are significant, therefore it seems no differences between the income categories are present. It seems that after controlling for the interaction the analysis using second sample have concluded the same results as previous models. In the case of the analysis using first sample, the inheritance was truly significantly different from zero even at the significance level 5% while the interaction shows relative significance at 10%. Therefore, it is questionable if it is reasonable to assume that the position in income category made such a huge difference when receiving inheritance. Nevertheless, the impact was still negative on happiness.

Amount of inheritance and net income are continuous variables, where it is possible that the given assumption that they are linear might be incorrect. Therefore, for the purpose of further robustness checks, it was decided to control for the possibility that both of the variables could have polynomial character namely the quadratic form. So instead of using logarithmic function for amount of inheritance and net income, additional variables representing quadratic forms of the variables have been controlled for. The results of this analysis can be viewed in the *table 4.4.* However, as it can be seen from all three models, none of the variables representing context of inheritance seems to be significant. Therefore, the null hypothesis that the coefficients are significantly different from zero cannot be

rejected. One of the reasons, why such outcome occurred is that the non-linearity of the given variables is unjustified and the logarithmic approximation is superior.

5 Conclusion and discussion

All in all, the main aim of this paper was to answer the central question: *to what extend does change in wealth affects the individual subjective wellbeing?* The main tool, which represents the change in wealth, was the income that has been received through inheritance. In order to answer this central question two hypotheses have been formulated.

The first hypothesis predicted, that receiving an inheritance would have significant positive effect on self-reported happiness. Following the results section, it is apparent that answer to this hypothesis is not so straightforward. Two different samples were used and in each a different measurement of happiness was applied. The results of the analysis, using the data of the first sample 2002-2017, showed that receiving an inheritance had a negative effect on reported happiness. However, only after controlling for additional parameters (namely the interaction between income categories and dummy variable for receiving an inheritance) the effect was found to be significant for significance level of 5%. In majority of other cases, the effect was significant only for 10% significance level. Using data for the second sample no significant effect of receiving inheritance was found. Even after conducting robustness checks, the conclusion stayed the same. Due to these conclusions, the first hypothesis is rejected. To be more precise, there has not been found sufficient evidence to prove it and with the limitations that were present, the verdict for the first hypothesis is clearly rejection. Regarding the limitations, they will be further discussed in this section.

The second hypothesis was looking at the relationship between the inheritance and the self-reported calmness. It was expected, that positive significant relation will be found as was suggested by mentioned sources of inspirations. Following the results of the subsequent analyses, even after controlling for different variables, the conclusion is that those who have received bequest have on average, reported to be significantly calmer than those who did not. This indicates that the idea that was outlined via the *Permanent income hypothesis* seems to be supported. The additional income that was received proved to have more calming effect than hedonistic. However, as already stated the limitations of this paper need to be considered when making final conclusions.

There are several limitations that need to be discussed, since they are limiting the conclusions to a significant degree. First, the statistical method used, namely the fixed effects regression for longitudinal data, is not the most trustworthy method from the internal validity

standpoint. The main issue is, that despite the fact that we get rid of time invariant omitted variables, there are still omitted variables that are not included in the data and are time varying. In other words, it is still unknown from where does the variation in the answers for the self-reported wellbeing comes from. Controlling for certain variables does not ensure that the conclusion will be truly exogenous. As was even discussed, the argument was given that using inheritance as the estimator for change of wealth is desirable, because it is in a sense random (exogenous). However, this is very strong assumption to make. Receiving inheritance relates to a death of an acquaintance. This event is without a doubt connected with negative emotions. Since no information was available in the dataset about this event it is hardly to distinguish the true, unbiased effect of inheritance and the sad emotions accompanied with it. In the case of the hypothesis one, it is not unlikely that the negative effect that was found out is exactly due to this reason. Besides that, individuals might expect to receive inheritance in the future period and therefore their behaviour might be altered even before the event of actually receiving the bequest (Meer et al., 2003). Therefore, the true effect might be mitigated. On top of that, as already stated, receiving an inheritance is not very common event. Approximately 5% of individuals have received inheritance in the observed time periods. Therefore, it is questionable if the inference analysis is not biased. It raises a question to what extend should be the conclusions from the analysis taken as truly causal.

Thirdly, following the previous discussion, the measurement of factors such as happiness and calmness is difficult. The level of subjectivity connected with these variables cannot be denied. Since five-point Likert scale was used it is difficult for an individual to report change in happiness. As *figures 3.7* and *3.17.* show majority of people considered themselves happy. Even from logical standpoint, it is difficult to assess what is the difference between very happy and happy. The pressure that very happy is the highest possible option, might deter any potential positive increases in reported wellbeing since the effect might not be that strong to truly choose the highest option. If, instead of the five/ six scale measure, a ten-point scale would be used, a more significant distinction between the answer options could have been observed and therefore the conclusions could have been different. On top of that, because main focus of this paper was to apply fixed effect regression, more appropriated regression for categorical variables could not have been used (e.g. ordered probit).

Despite the clear limitations that are present, I believe that it is still probable to give an answer to the central question. Overall, change in wealth does significantly affect reported wellbeing. The fact that people are clearly calmer even for significance level of 5% is indicative enough to give to a certain degree such an answer. However, it is always important

to take such statements with caution. Regarding the external validity of the results, the results can be applicable for the general population of the Dutch citizens. It is questionable if it is applicable to the whole population since the Dutch citizens are more wealthier and happier compared to the world averages. The results might be applicable to similar countries such as Denmark, Germany, etc. but it is a question for future empirical studies.

It is important to note that one of the propositions for future research is to use different measurement of wellbeing, since it is clearly questionable if any difference could have been observed only using five and six-point scales. Besides, it is also reasonable to question the applied method and thus usage of ordered probit might have been more appropriate. Different approach, using more quasi-experimental method such as IV-regression or regression discontinuity design, would clearly be superior when it comes to internal validity. Controlling for additional variables, such as variable indicating the relationship between the beneficiary and the relative who have passed away, could distinguish the effect of inheritance on reported wellbeing. However, overall, the main advice is to use more exogenous parameters indicating the change of wealth (e.g. such as the randomly assigned lottery winners mentioned in the research by Kuhn et al. (2011)).

The main implication for policy makers seems to resonate with the findings about the increased calmness. If the conclusion is truly causally valid, then providing additional sums of money to individuals, increases their reported level of calmness. This might prove useful in the case that aim of the policymakers is to establish calmer society. Additional benefits or sudden income packages would clearly lead to the desired outcome where people would be calmer.

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Appendix
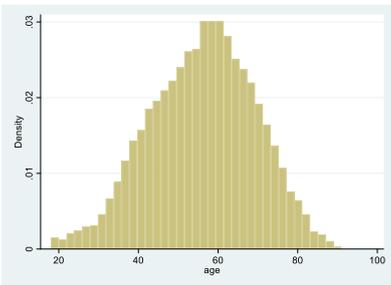
(a) 2002 - 2017
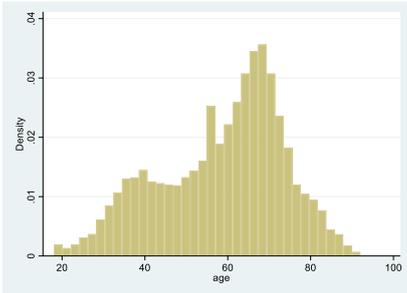
(b) 2013 - 2017

Figure 3.3.: Histogram of age for both samples for time periods:
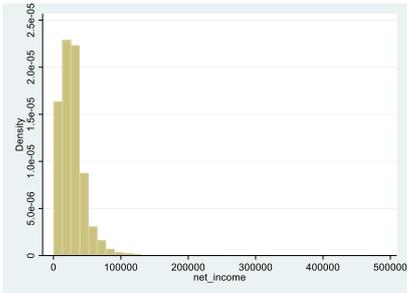
(a) Before
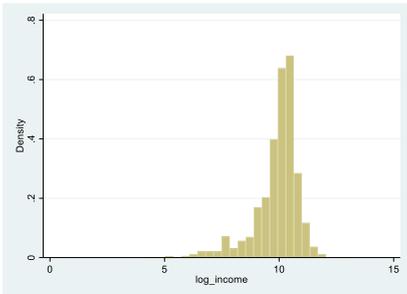
(b) After

Figure 3.4.: Histograms of net income before and after transformation comparison for time period 2002 – 2017
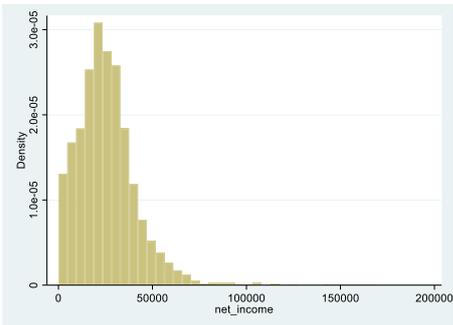
(a) Before
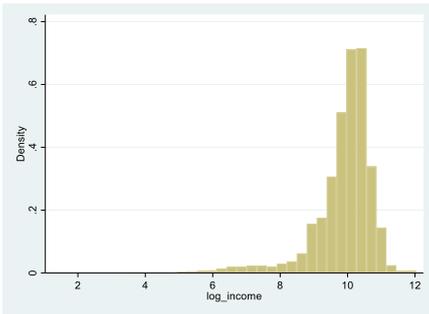
(b) After

Figure 3.4.: Histograms of net income before and after transformation comparison for time period 2013 – 2017

Descriptive Statistics for the sample observed between 2002-2017 (First sample) :

Table 3.1.: Describtive statistics of continous variables age and net income

Inheritance	Freq.	Percent	Cum.
No	5,974	95.0	95.0
Yes	315	5.0	100.0
Total	6 289	100.0	

Table 3.2. Descriptive statistics by person receiving inheritance or not

Variable	Obs	Mean	Std. Dev.	Min	Max
Age	6 289	56.15	13.38	18	91
Net income	6 289	27 979.96	21 214.99	1.178	481 614.2

Table 3.3.: Descriptive statistics by sex

Sex	Freq.	Percent	Cum.
Female	2,481	39.5	39.5
Male	3,808	60.6	100.0
Total	6,289	100.0	

Table 3.4.: Descriptive statistics of received amounts of inheritance

Variable	Obs	Mean	Std. Dev.	Min	Max	Median
Inheritance amount	315	21 834.86	70 307.69	272.66	706 880.3	4 984.05

Table 3.5.: Descriptive statistics of net income of individuals who have received inheritance

Variable	Obs	Mean	Std. Dev.	Min	Max	Median
Net Income	315	32 339.81	21 612.96	396.79	160 315.10	30 468.56

Table 3.6.: Descriptive statistics of net income of individuals who have not received inheritance

Variable	Obs	Mean	Std. Dev.	Min	Max	Median
Net Income	5 974	27 750.07	21 170.73	1.178	481 614.20	25 446.12

Table 3.7.: Descriptive statistics for self-reported happiness via 5-point scale

Happiness	Freq.	Percent	Cum.
Very happy	1,454	23.1	23.1
Happy	3,883	61.7	84.9
Neither	866	13.8	98.6
Unhappy	59	0.9	99.6
Very unhappy	27	0.4	100.0
Total	6,289	100.0	

Table 3.8.: Descriptive statistics for self-reported happiness via 5-point scale for individuals who have received inheritance

Happiness	Freq.	Percent	Cum.
Very happy	74	23.49	23.49
Happy	206	65.4	88.89
Neither	32	10.16	99.05
Unhappy	2	0.63	99.68
Very unhappy	1	0.32	100
Total	315	100	

Table 3.9.: Descriptive statistics for self-reported happiness via 5-point scale for individuals who have not received inheritance:

Happiness	Freq.	Percent	Cum.
Very happy	1,380	23.1	23.1
Happy	3,677	61.55	84.65
Neither	834	13.96	98.61
Unhappy	57	0.95	99.56
Very unhappy	26	0.44	100
Total	5 974	100	

Table 3.10.: Correlation table with focus on happiness

	Happiness	Inheritance amount	Inheritance
Happiness	1		
Inheritance amount	-0.0113	1	
Inheritance	-0.0170	0.2901	1

Descriptive Statistics for the sample observed between 2013-2017 (Second sample):

Table 3.11.: Describtive statistics of continous variables age and net income

Variable	Obs	Mean	Std. Dev.	Min	Max
Age	4 367	58.68	14.95	18	92
Net income	4 367	25 574.98	16 107.58	4.02	169 314

Table 3.12. Descriptive statistics by person receiving inheritance or not

Inheritance	Freq.	Percent	Cum.
No	4,131	94.6	94.6
Yes	236	5.4	100
Total	4 367	100	

Table 3.13.: Descriptive statistics by sex

Sex	Freq.	Percent	Cum.
Female	1 817	41.61	41.61
Male	2 550	58.39	100
Total	4 367	100	

Table 3.14.: Descriptive statistics of received amounts of inheritance

Variable	Obs	Mean	Std. Dev.	Min	Max	Median
Inheritance amount	236	15 074.61	31 762.92	150	300 000	5 000

Table 3.15.: Descriptive statistics of net income of individuals who have received inheritance

Variable	Obs	Mean	Std. Dev.	Min	Max	Median
Net income	236	28 025.38	17 924.12	45	160 315.1	26 093.27

Table 3.16.: Descriptive statistics of net income of individuals who have not received inheritance

Variable	Obs	Mean	Std. Dev.	Min	Max	Median
Net income	4 131	25 434.99	15 988.64	4.02	169 314.0	23 688.59

Table 3.17.: Descriptive statistics for self-reported happiness via 6-point scale

Happy	Freq.	Percent	Cum.
Never	20	0.46	0.46
Seldom	123	2.82	3.27
Sometimes	660	15.11	18.39
Often	1 062	24.32	42.71
Mostly	2 128	48.73	91.44
Continuously	374	8.56	100
Total	4 367	100	

Table 3.18.: Descriptive statistics for self-reported calmness via 6-point scale

Calm	Freq.	Percent	Cum.
Never	19	0.44	0.44
Seldom	151	3.46	3.89
Sometimes	512	11.72	15.62
Often	1,227	28.1	43.71
Mostly	2 106	48.23	91.94
Continuously	352	8.06	100
Total	4 367	100	

Table 3.19.: Descriptive statistics for self-reported happiness via 6-point scale for individuals who have received inheritance

Happy	Freq.	Percent	Cum.
Never	0	0	0
Seldom	7	2.97	2.97
Sometimes	44	18.64	21.61
Often	63	26.69	48.31
Mostly	104	44.07	92.37
Continuously	18	7.63	100
Total	236	100	

Table 3.20.: Descriptive statistics for self-reported happiness via 6-point scale for individuals who have not received inheritance:

Happy	Freq.	Percent	Cum.
Never	20	0.48	0.48
Seldom	116	2.81	3.29
Sometimes	616	14.91	18.2
Often	999	24.18	42.39
Mostly	2024	49	91.38
Continuously	356	8.62	100
Total	4131	100	

Table 3.21.: Descriptive statistics for self-reported calmness via 6-point scale for individuals who have received inheritance:

Calm	Freq.	Percent	Cum.
Never	1	0.42	0.42
Seldom	9	3.81	4.24
Sometimes	24	10.17	14.41
Often	76	32.2	46.61
Mostly	111	47.03	93.64
Continuously	15	6.36	100
Total	236	100	

Table 3.22.: Descriptive statistics for self-reported calmness via 6-point scale for individuals who have not received inheritance:

Calm	Freq.	Percent	Cum.
Never	18	0.44	0.44
Seldom	142	3.44	3.87
Sometimes	488	11.81	15.69
Often	1 151	27.86	43.55
Mostly	1 995	48.29	91.84
Continuously	337	8.16	100
Total	4 131	100	

Table 3.23.: Correlation table with focus on happiness

	Happy	Inheritance amount	Inheritan
Happy	1		
Inheritance amount	0.024	1	
Inheritance	-0.022	0.420	1

Table 3.24.: Correlation table with focus on calmness

	Calm	Inheritance amount	Inheritan
Calm	1		
Inheritance amount	0.022	1	
Inheritance	-0.009	0.420	1

Table 4.2 Fixed effects regression using the extension of different categories of amounts inherited[9]

Legend: Coefficient/ Robust Std. Errors/ P>|t|			
Variables	**Happines 3**	**Happy 3**	**Calm 3**
Net income	-0.0106	-0.0307	-0.0007
	0.0127	0.0218	0.0241
	0.404	0.158	0.977
Third caegories			
First	-0.0766	0.0701	0.1620
	0.0620	0.0756	0.1042
	0.217	0.354	0.120
Second	-0.0493	0.0216	0.0527
	0.0599	0.1002	0.1115
	0.410	0.829	0.636
Third	-0.0670	0.0907	0.1956
	-0.0364	0.0893	0.1066
	0.066	0.310	0.067
Constant	2.4359	3.4554	3.8807
	0.2211	0.5456	0.5413
	0.000	0.000	0.000
# of individuals		1,246	
Total # of observations	6289	4367	4367
F-test	4.30	1.85	2.19
Prob > F	0.000	0.065	0.026

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[9] In the model additional control variables are included namely, age and year (categorical variable that captures the yearly trend of the reported outcome variable). Net income represents the logarithmic version of the net income.

Table 4.3. Fixed effects regression using the extension of controlling for interaction between receiving an inheritance and different income quantiles[10]

Legend: Coefficient/ Robust Std. Errors/ P>|t|			
Variable	**Happines 4**	**Happy 4**	**Calm 4**
Dummy inheritance			
Yes	-0.1641	0.1394	0.2973
	0.0705	0.1128	0.1421
	0.020	0.217	0.037
Income quantiles			
2nd quantile	-0.0091	-0.0057	0.0975
	0.0266	0.0512	0.0537
	0.732	0.912	0.070
3rd quantile	0.0069	-0.0869	0.0367
	0.0302	0.0584	0.0613
	0.818	0.137	0.550
4th quantile	-0.0214	-0.0964	-0.0312
	0.0338	0.0664	0.0703
	0.528	0.147	0.658
Interaction			
Yes*2nd quantile	0.0101	0.0506	-0.2098
	0.1205	0.1421	0.1702
	0.933	0.722	0.218
Yes*3rd quantile	0.1456	-0.2175	-0.1571
	0.0875	0.1496	0.1744
	0.097	0.146	0.368
Yes*4th quantile	0.1585	-0.1209	-0.2337
	0.0856	0.1344	0.1745
	0.065	0.369	0.181
Constant	2.3244	3.2323	3.8747
	0.1466	0.5107	0.4973
	0.000	0.000	0.000
# of individuals	611	1 246	1 246
Total # of observations	6 289	4 367	4 367
F-test	3.83	1.83	2.22
Prob > F	0.000	0.045	0.012

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[10] In the model additional control variables are included namely, age and year (categorical variable that captures the yearly trend of the reported outcome variable). Net income represents the logarithmic version of the net income.

Table 4.4. Fixed effects regression using the extension of controlling for polynomial form of variables[11][12]

Legend: Coefficient/ Robust Std. Errors/ P>|t|			
Variables	**Happines 5**	**Happy 5**	**Calm 5**
Amount of inheritance	-0.0014	0.0012	0.0044
	0.0009	0.0021	0.0027
	0.140	0.571	0.110
Amount of inheritance^2	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000
	0.119	0.629	0.285
Net income	-0.0006	-0.0067	-0.0002
	0.0008	0.0027	0.0028
	0.403	0.014	0.946
Net income^ 2	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000
	0.298	0.005	0.930
Constant	2.3692	3.3377	3.8958
	0.1715	0.5148	0.4988
	0	0	0
# of individuals	611	1 246	1 246
Total # of observations	6 289	4 367	4 367

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[11] In the model additional control variables are included namely, age and year (categorical variable that captures the yearly trend of the reported outcome variable).

[12] The normative variables' coefficients, are multiplied by 1000 therefore it shows a change of 1000 € and not a change of a 1 € increase.