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# **The Relationship Between Field of Study and Stock Market Participation in the Netherlands**

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## **Abstract**

A major issue in household finance is the fact that a large number of individuals do not participate in the stock market, despite the potential benefits it may offer. Not participating in the stock market can lead to high welfare losses for individuals. The purpose of this study is to contribute to the stock market participation puzzle within the Dutch context. This study investigates the relationship between field of study and stock market participation among individuals in the Netherlands, utilizing data from the LISS panel. The study further examines the relationship between education level and stock market participation, employing a fixed effects regression analysis to control for individual-specific characteristics. The study hypothesizes that graduates from quantitative fields of study are more likely to participate in the stock market than graduates from non-quantitative fields of study. Furthermore, the study suggests, based on existing literature, that individuals with higher levels of education are more likely to participate in the stock market than those with lower levels of education. Contrary to the expectations, the findings reveal that certain non-quantitative fields of study are significantly associated with stock market participation. In addition, the results confirm that individuals with higher levels of education in the Netherlands are more likely to participate in the stock market compared to individuals with lower levels of education.

**Keywords:** Stock market participation, field of study, education level, household finance, financial literacy, Netherlands, LISS panel, investment behavior, financial well-being.

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# 1 Introduction

According to Campbell (2006), investment mistakes are a focal point in household finance<sup>1</sup>. In his presidential address at the American Finance Association<sup>2</sup>, he argued that “although many households find adequate solutions to the complex investment problems they face, some households make serious investment mistakes” (Merkoulova & Veld, 2022; Xiao & Tao, 2021). These mistakes vary from not investing in risky asset markets to under-diversifying portfolios and failing to exercise options.

The main concern in household finance, however, is the reason behind the remarkably low level of stock market participation by individuals and households. This is known as the stock market participation puzzle (SMPP) in the finance literature. It focuses on the empirical finding that a large number of individuals do not participate in the stock market, despite the potential benefits it may offer (Gardini & Magi, 2007; Guiso et al., 2005). Not participating in the stock market can lead to high welfare losses for individuals (Cocco et al., 2005; Dong et al., 2023; Sivaramakrishnan et al., 2017). Traditional economic theory would argue that individuals make rational decisions and hence invest in the stock market. However, over the last few decades, behavioral scientists discovered the complexity of the underlying reasons not to participate in the stock market (Ramnér, 2023).

According to recent research on the SMPP in the Netherlands, there is an inherent aversion to stock market participation among women, elderly, people with low income, low-educated, those from lower social classes, and people with less financial literacy<sup>3</sup> (Merkoulova & Veld, 2022). Moreover, the authors found that inertia - the unwillingness to invest time and effort on investing in stocks - played an essential role. Additional factors that explain stock market (non)-participation in general include the individual’s community (Brown et al., 2008), IQ (Grinblatt et al., 2011), previous stock-market experiences (Malmendier & Nagel, 2011), cultural background (Weisfeld-Spolter et al., 2018) and trust (Guiso et al., 2005).

<sup>1</sup> Household finance examines how households use financial instruments to attain their objectives (Campbell, 2006).

<sup>2</sup> The American Finance Association (AFA) is the premier academic organization devoted to the study and promotion of knowledge about financial economics (<https://afajof.org/>).

<sup>3</sup> People are financially literate when they know the things they need know in order to make important financial decisions in their own best interest (Sivaramakrishnan et al., 2017).

As such, the academic literature has focused extensively on the factors affecting stock market participation. Various demographic and psychological variables and their impact on stock market participation have been studied. The literature consistently shows that individuals with higher levels of education are more likely to participate in the stock market (Furnham et al., 2024; Vissing-Jorgensen, 2003), but the specific impact of the field of study has received less attention. According to a few studies (Dong et al., 2023; van Rooij et al., 2011), individuals refrain from investing in the stock market because they lack knowledge of the basic principles of economics and finance. Nonetheless, no systematic investigation has been conducted into which fields of study in the Netherlands are more active in the stock market. This lack of understanding may contribute to the persistence of (income) inequality, with fields of study understanding the benefits of stock market investing positioned against those that do not.

This study, thus, contributes to the stock market participation literature by examining the relationship between field of study and stock market participation in the Netherlands. In this way, the study can assess whether individuals who have completed an education in financial fields are more likely to participate in the stock market than those who have completed an education in other areas. The study will also assess the impact of education level on stock market participation. Consequently, the research seeks to answer the following research question: *“What is the relationship between field of study and stock market participation in the Netherlands and what role does the level of education play?”*

Further research into the factors affecting stock market participation in the Netherlands could help individuals in improving their financial well-being<sup>4</sup> (Aubrey et al., 2022). Policies that highlight the potential benefits of stock market participation may be necessary, particularly if implemented at an early age, considering the compounding effect of long-term investments. Moreover, young adults are more likely to make financial mistakes than older individuals (Agarwal et al., 2007). Therefore, young adults may benefit from considering the idea of investing in stocks.

This study contributes to our knowledge of how a person’s background – including their field of study and education level – affects their participation in the stock market. This knowledge may be useful to policymakers, educational institutions, and financial advisors since it allows them to better create strategies and programs that encourage participation in the stock market among

<sup>4</sup> Financial well-being occurs when individuals are able to meet their expenses with some money left over, are in control of their finances, and feel financially secure now and in the future (Aubrey et al., 2022).

specific groups. It has been argued that financial education programs are more effective when targeted to specific groups of the population (van Rooij et al., 2011). Accordingly, financial programs can be adapted to those fields of study that invest relatively little or not at all.

The rest of the paper proceeds as follows: section 2 discusses the findings of previous studies and develops hypotheses. Section 3 describes the research design that will be used. Section 4 presents the descriptive statistics. Section 5 reports the empirical results. Section 6 summarizes conclusions, discusses the limitations of the research, and offers recommendations for future research.

## 2 Literature review

This section starts with an explanation of how traditional economic theory would expect people to behave in the context of the stock market. The current situation of stock market participation in the Netherlands is then discussed. Subsequently, prior research on the factors affecting stock market participation is used to formulate the hypotheses. Finally, additional key factors influencing stock market participation will be discussed.

### 2.1 Traditional economic theory on stock market participation

According to traditional economic theory, individuals are rational and seek to maximize utility by, for example, diversifying their portfolios (Markowitz, 1952; Sharpe, 1964). Given that stock market investments have historically offered higher returns than other financial instruments such as savings accounts and bonds (Dimson et al., 2002), economic theory suggests that individuals should participate in the stock market to enhance their financial well-being. This assumption forms the theoretical basis for the expectation that individuals, or at least a substantial proportion of the population, would invest in the stock market to achieve higher returns and enhance financial well-being.

However, this expectation oversimplifies the complexity of individual decision-making processes in the context of the stock market. Conlin et al. (2015) show that personality traits such as impulsiveness, fear of uncertainty, and persistence also play a key role in the participation decision. This highlights the fact that variables other than economic factors are also relevant. People with a strong fear of uncertainty, for example, tend to avoid the stock market. Compared to people who are less-risk averse, they may perceive the risks associated with stock market investing as being higher. Investors who are overconfident, on the other hand, may overestimate the value of their private information. This will cause them to trade too actively which leads to lower returns (Barber & Odean, 2000).

Furthermore, the rational decision-making process proposed by traditional economic theory is questioned by behavioral biases such as loss aversion (Tversky & Kahneman, 1992), which is the tendency to prefer avoiding losses over obtaining equivalent gains, and the disposition effect (Shefrin & Statman, 1985), which is the tendency to sell assets that have increased in value too



soon while keeping assets that have decreased in value too long. These biases may contribute to the decision of not participating in the stock market at all.

## 2.2 Stock market participation in the Netherlands

Despite the theoretical expectation that rational individuals would participate in the stock market to maximize utility, empirical data shows discrepancies between this theory and actual behavior. This section describes the current state of stock market participation in the Netherlands, indicating that only a tiny portion of the population participates in the stock market.

In 2021, the Netherlands has 8 million private households. According to research conducted by the Dutch Authority for the Financial Markets (AFM), 1.9 million of them are investing at the end of 2021 (AFM, 2021). In the third quarter of 2023, the total amount invested in stocks in the Netherlands was 55.6 billion euros (DNB, 2023). When compared to the savings deposits held by Dutch households (€449.3 billion by the end of June 2023), this amount remains relatively low. It means that by the end of June 2023, Dutch households had invested an average of 12,4% of their savings.

According to a trend analysis<sup>5</sup> produced by the AFM, technological advancements in recent decades have had a significant impact on how we deal with our finances (AFM, 2022). The internet makes financial assets such as stocks more accessible, lowering the barrier to purchasing them (Bogan, 2008). Furthermore, low and negative interest rates are other reasons for Dutch citizens to start with investing in the stock market.

The AFM conducted research among new investors, defined as those who have been investing for less than two years, and asked them to identify the most important reason they started investing. The most important reason, according to 76 percent of the respondents, was to receive higher returns than they would obtain from a savings account. For 38 percent, the possibility of a negative interest rate in the future played an important role. Regardless of these factors, the stock market participation rate remains relatively low.

High entry costs are one of the classic reasons for households' low stock market involvement. Peress (2005) showed that U.S. stock market participation increased remarkably over the second half of the 20<sup>th</sup> century, with reducing entry costs being one of the key reasons. Furthermore, many

<sup>5</sup> <https://verslaggeving.afm.nl/trendzicht-2022/financiele-dienstverlening/overlay/execution-only-beleggen/>

households avoid investing in the stock market because they have little knowledge of stocks, the working of the stock market, and asset pricing (van Rooij et al., 2011). This indicates a lack of financial literacy, and research has shown that it is a strong predictor of participation in the stock market.

Households that do participate in the stock market, prefer to invest in domestic markets rather than foreign markets (Ardalan, 2019). This is known as the home bias<sup>6</sup>. Dutch households also relatively often choose the home market. By the end of 2021, Dutch households had invested €63.1 billion in stocks, including €28.9 billion in Dutch stocks, which amounts to 45.8 percent.

### **2.3 Field of study and stock market participation**

As highlighted in the introductory chapter, there is little research examining the impact of completing a specific field of study on one's activity in the stock market. Nevertheless, empirical evidence suggests that individuals with a background in quantitative disciplines have more financial literacy and numeracy skills, which may be necessary to understand and navigate the complexities of the stock market (Bucher-Koenen et al., 2021; Hermansson et al., 2022; Lusardi, 2012; van Rooij et al., 2011). Understanding the principle of compounding interest and doing percentage calculations are two examples of numeracy skills.

Fields of study such as finance, economics, mathematics, and statistics frequently include coursework that improves students' analytical skills. Coursework in finance, for example, may provide students with insights into investment theories, financial risk management, and asset pricing. Similarly, coursework in mathematics and statistics trains students (implicitly) to interpret market data and to develop quantitative models for portfolio management. These skills may lower the barrier to start with investing and be helpful to develop investment strategies.

Grinblatt et al. (2011) found that IQ, which was assessed using mathematical ability as one of the three indicators, is a significant predictor of stock market participation. Furthermore, Luotonen (2009) found that the field of study is a key predictor in distinguishing investors from non-investors. However, the study focused more on personal values, such as political orientation and trust. In addition, the study was conducted in a Finnish setting.

<sup>6</sup> The equity home bias is the empirical finding that people overinvest in domestic stocks relative to the optimal investment portfolio suggested by modern portfolio theory (Ardalan, 2019)

Overall, individuals graduating in quantitative disciplines may be more confident and competent to invest in the stock market compared to individuals graduating in non-quantitative disciplines. Appendix A Measurement of variables provides an overview of which fields of study are considered to be quantitative and which are considered to be non-quantitative. Behind the names of the different fields of study, brackets indicate whether the field of study is considered quantitative (Q), non-quantitative (NQ), or generic (G). Sections 3.2.1 and 3.3.1 in the Methodology chapter provide more information about the variable and its operationalization.

Quantitative fields of study include those that rely heavily on mathematics, statistics, and numerical analysis (e.g., STEM<sup>7</sup> studies). Non-quantitative fields of study include those that mainly use qualitative research methods, such as textual analysis and interviews (e.g., humanities). Generic fields of study are those that use both qualitative and quantitative research methods, depending on the specific research question. The discussion leads to the first hypothesis:

**Hypothesis 1.** Graduates from quantitative fields of study are more likely to participate in the stock market than graduates from non-quantitative fields of study.

## 2.4 Education level and stock market participation

The level at which an individual completes his or her education can also play a significant role in shaping financial behavior and attitudes towards investing. Higher education levels are associated with enhanced financial literacy, cognitive abilities, and access to better employment opportunities (Kaustia et al., 2023; Lusardi & Mitchell, 2011). These factors contribute to the ability to make sound financial decisions. Empirical evidence shows that both subjective financial literacy, the perception of one's financial expertise, and objective financial literacy, the actual financial knowledge possessed by individuals, positively influences investment intention (Sivaramakrishnan et al., 2017; van Rooij et al., 2011).

Compounding interest, inflation, and the time value of money are examples of financial concepts that people with financial knowledge may be familiar with (van Rooij et al., 2011). According to van Rooij et al. (2011), very few people in their dataset, which comprises a

<sup>7</sup> STEM is an umbrella term that stands for science, technology, engineering, and mathematics. The term is used to group together the distinct but related technical disciplines.

representative sample of the Dutch population, have extensive knowledge of financial concepts. A lot of respondents do not understand the differences between bonds and stocks and have no knowledge about the basics of diversification. This highlights the Dutch population's lack of basic financial knowledge and the need to implement policies and financial education that provide Dutch individuals with the necessary knowledge. Financial knowledge should therefore certainly not be taken for granted (Atkinson & Messy, 2012).

Individuals with higher levels of education are more likely to understand complex financial concepts and principles. This allows them to understand and assess investment options more effectively. Furthermore, higher levels of education foster critical thinking and problem-solving skills, which are important elements in the realm of investing. According to Thomas and Spataro (2018), college graduates have a greater chance to hold stocks than those with lower education levels. Cole and Shastry (2008) suggest that one year of schooling increases the chance of financial market participation by 7-8%.

Moreover, empirical studies on stock market participation that control for educational attainment, show that financial literacy becomes even more significant (Behrman et al., 2012; Lusardi & Scheresberg, 2013; van Rooij et al., 2011). These findings support the notion that general knowledge (education) and financial knowledge (financial literacy) contribute to the financial decision-making process (Thomas & Spataro, 2018).

Higher levels of education are also typically associated with higher income levels and socioeconomic status, providing individuals with more resources that they can allocate towards investments. This financial stability could encourage individuals to explore investment opportunities in the stock market to increase their wealth. The discussion leads to the second hypothesis:

**Hypothesis 2.** Individuals with higher levels of education are more likely to participate in the stock market compared to those with lower levels of education.

## 2.5 Additional factors

This section provides an overview of important additional factors affecting stock market participation. The academic literature frequently brings up these factors. The study will first discuss the individual-level factors, then the behavioral factors, and lastly the institutional factors.

### 2.5.1 *Individual-level factors*

First, risk aversion is a key factor that influences whether or not a person chooses to participate in the stock market, which was also mentioned in section 2.1 (Grable & Lytton, 1999; Sivaramakrishnan et al., 2017; van Rooij et al., 2011). Risk-averse individuals typically stay away from the stock market. Dimmock and Kouwenberg (2010) have showed that a higher level of loss aversion is linked to a lower chance of participating in the stock market. Fear of potential losses can create psychological barriers that prevent individuals from investing in the stock market. Therefore, loss aversion can play a significant role in shaping attitudes of individuals towards the stock market.

Second, Grinblatt et al. (2011) showed that stock market investing is more common among individuals with higher cognitive abilities, as measured by a standardized IQ test. The IQ test employed comprised 120 questions that evaluated three different domains of cognitive functioning: mathematical, verbal, and logical skills. A composite intelligence score, or IQ, was generated by combining these three domains. The study controlled for wealth, income, age, and other demographic and occupational information. Ultimately, the correlation between IQ and stock market participation appears to be rather high. Individuals in the highest IQ stanine have a 20.5% higher participation rate than individuals in the lowest IQ stanine. The study also concluded that this large difference in stock market participation rate may contribute to the wealth gap between people with low and high IQ levels.

Third, previous experiences that individuals have in the stock market can also play an important role in the participation decision (Malmendier & Nagel, 2011). Individuals are more inclined to participate in the stock market when they have previously experienced higher stock market returns. This factor may seem obvious, but it is also linked to another one, namely trust. Individuals who have previously experienced higher stock market returns could have more trust in the financial system than those who have experienced negative or very low stock market returns. Guiso et al. (2005) showed that the amount of trust<sup>8</sup> in the financial system may be crucial for the decision to invest in stocks or not. They evaluated their predictions using a sample of Dutch households and found that trusting individuals are more likely to buy stocks and risky assets. The

<sup>8</sup> They measured the level of generalized trust by using the following question: “Generally speaking, would you say that most people can be trusted or that you have to be very careful in dealing with people?”. This question is also used in the World Values Survey, a well-established cross country survey.

results are robust when controlling for differences in risk aversion and ambiguity aversion. Thus, levels of trust in the financial system in general are also important.

### *2.5.2 Behavioral factors*

As was mentioned in section 1, the community in which one resides also appears to be an important factor affecting individuals' participation in the stock market. The presence of peers and friends participating in financial markets, such as the stock market, increases the likelihood of stock market participation. This phenomenon highlights the potential strength of having a great social network for financial well-being. Brown et al. (2008) substantiate this phenomenon empirically by showing that one's community determines whether one participates in the stock market. According to Hong et al. (2001), households engaging with their neighbors or attending church are more likely to participate in the stock market than non-social households, assuming all else remains constant. As a result, one may want to consider his or her social network in order to improve financial wellbeing.

### *2.5.3 Institutional factors*

In order to encourage stock market participation, governments should ensure regulations and investor protection (Kaustia et al., 2023). According to Christelis et al. (2013), there is a positive relationship between stock market participation rates and the antidirector rights index (ARDI), a commonly used measure of shareholder protection. Moreover, they showed that U.S. households tend to invest more in stocks and less in homes compared to Europeans households of similar characteristics. This highlights the potential role of institutions, which may be conducive to stock market investing.

### 3 Methodology

This section describes the study's methodology, beginning with a description of the sample used. After that, an explanation of how the relevant variables are measured will be provided. The data preparation process will next be discussed. The specific methods employed to address the research question are explained at the end of the chapter.

#### 3.1 Sample

To investigate the research question, the study uses LISS panel<sup>9</sup> to extract data on Dutch households' economic situation and educational background. Specifically, the study employs the LISS Core Study. This is an annual longitudinal survey consisting of multiple questionnaires covering a broad range of topics. Currently, the LISS Core Study distinguishes eleven different modules. Every module focuses on a different topic, such as health, religion and ethnicity, and politics and values.

The panel is a good representation of the Dutch population because it is based on a true probability sample of households, drawn from the population register by Statistics Netherlands (CBS). The panel consists of 5000 households which is approximately equal to 7500 individuals aged 16 or older. Self-selection is not possible because participation takes place by invitation only. Individuals who do not have a personal computer to complete the survey, will be loaned one. Taking care of such matters has led to a representative sample of individuals, making the results generalizable to the Dutch population.

The sample for this study comprises a total of 12,962 unique individuals over 8 survey years. The analysis covers the years 2008, 2010, 2012, 2014, 2016, 2018, 2020, and 2022. The upcoming sections provide information about why these years are covered, and not the years in between.

#### 3.2 Variables

Three distinct variables are used to evaluate the hypotheses. The measurement of these variables will be covered first, followed by an explanation of the data preparation process.

<sup>9</sup> <https://www.lissdata.nl/>

### 3.2.1 *Field of study*

The first independent variable of the research is field of study. It is derived from the LISS Core Study. Specifically, the study employs the “Work and Schooling” module. The module focuses on labor market participation, job characteristics, pensions, and schooling and courses. Appendix A Measurement of variables displays all the different fields of study that respondents may have followed. The total list consists of seventeen different options. The options range from humanities to technology. If the respondent indicates a specific field of study, it denotes that this is the highest level of education he or she has attained. However, multiple answers may be selected. Respondents who completed multiple studies (e.g., individuals with a double study), will be categorized under the “Multiple studies” dummy variable. Furthermore, the current study groups several fields of study with a high degree of overlap under a single umbrella term, such as “STEM”. Please refer to Appendix A Measurement of variables for further information on the operationalization.

A respondent, for example, may have completed just one field of study in the first survey year (2008), but multiple fields of study in the third survey year (2012). The variable can thus change over time for respondents, also because it represents the field of study completed in the highest education level. Respondents may switch their field of study over time.

### 3.2.2 *Stock market participation*

The dependent variable of the study is stock market participation. It is also based on the LISS Core Study. Specifically, the study employs the “Economic Situation: Assets” module. The module focuses on, as the name suggests, assets of the panel members. The question that is used to assess stock market participation is the following: “What was the total value of your investments (growth funds, share funds, bonds, debentures, stocks, options, warrants) on 31 December ....?” This data was collected in the years 2008, 2010, 2012, 2014, 2016, 2018, 2020, and 2022.

As such, the total amount reported by respondents may also include other types of investments. However, the current study uses the amount as a proxy for stock market participation since it reflects the overall investment behavior of the respondents. Stocks tend to be one of the most popular and recognized financial products in the Netherlands (DNB, 2023). Therefore, it is likely that those who respond with a positive value in the survey also hold stocks. However, this can be regarded as a limitation, see section 6.2 for additional information.



### 3.2.3 Education level

The second independent variable of the study is education level. It is also derived from the “Work and Schooling” module, and thus extracted from the LISS Core Study. Appendix A Measurement of variables displays all the different levels of education that the respondents can choose of. A doctor’s degree represents the highest level of education, while not finishing any kind of formal schooling is the lowest level of education among respondents. This variable can also change over time. A respondent, for example, can progress from professional education to academic education in a specific field of study. Highly educated individuals may be more aware of complex financial theories, such as the capital asset pricing model<sup>10</sup>, allowing them to make better investment decisions (Perold, 2004). Consequently, compared to those with lower education levels, they may be more inclined to invest in the stock market.

Because of the large number of education levels in the LISS panel dataset and the complexity of interpreting the results that would follow, this study uses the “Standaard Onderwijsindeling – SOI – 2021<sup>11</sup>” to operationalize this variable. SOI’ 21 is a hierarchical classification of educational levels into four aggregation levels. This study used the highest aggregation level, allowing for the easiest interpretation. The highest aggregation level distinguishes between lower, middle, and higher education. However, the current study additionally categorizes higher education into two types: professional and academic education. Respondents can also select “Other” as their education level. As a result, the current study differentiates five education levels. Please refer to Appendix A Measurement of variables to see which education levels correspond to lower, middle, professional, academic, and other respectively.

## 3.3 Data preparation

This section describes the systematic approach used to prepare the data for analysis. The data preparation process involved several steps to enhance the quality of the dataset.

<sup>10</sup> The Capital Asset Pricing Model (CAPM) was the first model that provided a framework for relating the required return on an investment to the risk of that investment (Perold, 2004).

<sup>11</sup> <https://www.cbs.nl/nl-nl/onze-diensten/methoden/classificaties/onderwijs-en-beroepen/standaard-onderwijsindeling--soi--/standaard-onderwijsindeling-2021>

First, variable names were standardized across the different years. The years included in the analysis are 2008, 2010, 2012, 2014, 2016, 2018, 2020, and 2022. These are the years for which LISS panel has data available on the assets of its respondents. In contrast, data regarding respondents' educational background is available on an annual basis. The variable name "nomem\_encr", used by LISS, was renamed to "Respondent\_ID", and the codes for each field of study distinguished by LISS were renamed to the actual study. This improved the clarity and consistency of the data. Columns for "Year", "Field of study", and "Education level" were added. The field of study and education level variables were operationalized according to Appendix A Measurement of variables. The operationalization is in line with SOI' 21. However, over the years, the number of education levels increased so the threshold distinguishing different education levels changed. This has been carefully examined for each year. Appendix A Measurement of variables displays the number of education levels in the Netherlands for the sixteenth wave, which is 28.

### *3.3.1 Field of study*

The field of study variable has been revised by categorizing "I don't know" responses as "Other". Respondents who did not answer this specific question were marked as "Unknown". However, this is only a small amount.

A dummy variable "Multiple studies" was constructed for respondents who reported that they had completed multiple fields of study. The dummy variable allows for an analysis of the impact of completing multiple studies on stock market participation. However, it does not consider which fields of study the respondent completed. Typically, respondents in the "Multiple studies" category completed two fields of study. However, in exceptional cases respondents completed up to seven different studies.

### *3.3.2 Stock market participation*

For the stock market participation variable, the responses "I prefer not to say" and "I don't know" were combined into a single category named "Other". This change was made to simplify the data and to ensure a more coherent analysis.

Using the absolute value, all negative stock market participation values were converted to positive numbers. This adjustment was made to ensure the accuracy of the fixed effects analysis. However, negative amounts were rare (only if the respondent wrote an option). These observations were not present in all waves.

### 3.3.3 *Education level*

Respondents who did not indicate their highest level of education were classified as “Unknown” and subsequently removed from the dataset. This is only a handful of observations.

### 3.3.4 *Income*

The income variable was compiled from various sources of income. The LISS panel distinguishes the following types of income sources: block employer, block self-employed, block pensions, block benefits, block other sources of income, and block other forms of income. All of these were taken into account when determining the total income of the respondents. The overall amount is used as a control variable. For an overview of all different types of income, please refer to Appendix A Measurement of variables.

Eventually, data from the different modules were merged to create a comprehensive dataset. The data has been organized in long format. This means that you can observe a respondent's educational background (field of study and education level) and investment behavior over time. Some respondents are only present in a few survey years, while others participated in all survey years. As a result, the panel data is unbalanced. Only respondents who completed all three modules are included in the analysis. In some cases, respondents only completed the “Work and Schooling” module but not the “Economic Situation: Assets” and “Economic Situation: Income” module. Please refer to Table 4 Respondent Attrition Statistics to see how many respondents have been removed each year.

## 3.4 **Model and robustness**

For the analysis, the study uses a fixed effects regression analysis to examine the relationship between field of study, education level, and stock market participation in the Netherlands. The analysis will involve running a fixed effects model in which all personal characteristics are filtered out by adding the individuals as fixed effects into the model. This approach allows to control for time-invariant individual characteristics such as personality traits<sup>12</sup>, norms and values, cultural background and other unobservable individual heterogeneity (Calvet et al., 2009). The inclusion

<sup>12</sup> According to Calvet et al. (2009), personality traits, such as trust, can explain the persistence reluctance or inclination to invest in risky assets such as stocks.

and assignment of the individuals as a fixed effect will improve the robustness of the estimated coefficients (Gormley & Matsa, 2013). Individuals are assigned as fixed effects using the corresponding respondent IDs. The method isolates the effect of the variables field of study and education level on stock market participation, while controlling for stable, unobserved individual differences over time. The model specification looks as follows:

$$Y_{it} = \beta_0 + \beta_1 X_{1,it} + \beta_2 X_{2,it} + \alpha_i + \varepsilon_{it}$$

Where:

- $Y_{it}$  represents the dependent variable (stock market participation) for individual  $i$  at time  $t$ .
- $X_{1,it}$  represents the independent variable (field of study) for individual  $i$  at time  $t$ .
- $X_{2,it}$  represents the independent variable (education level) for individual  $i$  at time  $t$ .
- $\beta_0$  is the intercept term.
- $\beta_1$  represents the coefficient for the independent variable field of study.
- $\beta_2$  represents the coefficient for the independent variable education level.
- $\alpha_i$  represents the individual-specific fixed effect.
- $\varepsilon_{it}$  is the error term.

## 4 Descriptive statistics

### 4.1 Descriptive statistics

This section presents descriptive statistics for the main variables. Table 1 provides an overview of the main variables included in the study for all eight years: 2008, 2010, 2012, 2014, 2016, 2018, 2020, and 2022. The number of respondents varied each year, with in 2014 the highest number of respondents, 5401, and in 2022 the lowest number of respondents, 4664. Table 4 in Appendix B Additional tables shows how much respondents were excluded each year because they did not participate in all three modules used in the study. The mean age of respondents increased consistently over the survey years, starting at 46 in 2008 and reaching 55 in 2022. This trend suggests an aging sample population over the study period. This is probably due to the longitudinal nature of the study.

The average income of respondents fluctuated over the years. The average income in 2008 was €19.901,60, and the maximum average income in the dataset was €29.005,88 in 2014. Respondents earned the least in the first survey year, 2008. In addition to gross wages, respondents received income from various sources, such as profits, pensions, benefits, and other sources<sup>13</sup>. However, wages were the most common form of income, obviously.

The most popular and completed field of study changed over the years. Studies in STEM fields were the most popular in 2008. In 2010 and 2012, the most common field of study shifted to general. From 2014 onwards, business becomes the most common field of study. The most common education level fluctuates between lower and middle education. Lower level education is predominant in 2008, 2010, 2012, 2018, and 2022. Middle level education is more common in 2014, 2016, and 2020.

The average amount invested in the stock market fluctuates over the years. In 2008, the average amount invested in stocks was €5.876,27. By 2010, the amount invested increased to €61.141,50. However, this high value can be attributed to two panel members. The record holder invested €205.288.000,00 in stocks this year, while the second highest invested €57.964.435,00. Without these respondents, the average would have been €5.836,37, which is more comparable to the other years. From 2014 onwards, the average amount invested in stocks increased consistently,

<sup>13</sup> All possible sources of income are detailed in Appendix A Measurement of variables.

reaching €11.224,80 in 2022. Research suggest that Dutch people increased their investments since the COVID-19 pandemic (Ortmann et al., 2020).

**TABLE 1** DESCRIPTIVE STATISTICS FOR THE VARIABLES OVER THE YEARS

<b>Year</b>	<b>Number of Respondents</b>	<b>Mean Age</b>	<b>Mean Income</b>	<b>Mode Field of Study</b>	<b>Mode Education Level</b>	<b>Mean Stock Market Participation</b>
2008	5385	46	€19.901,60	STEM	Lower	€5.876,27
2010	5051	49	€24.608,90	General	Lower	€61.141,50
2012	5140	50	€24.484,50	General	Lower	€5.406,77
2014	5401	50	€29.005,88	Business	Middle	€5.027,51
2016	4812	52	€22.316,15	Business	Middle	€5.235,73
2018	4726	53	€21.497,69	Business	Lower	€6.289,79
2020	4880	53	€25.552,26	Business	Middle	€7.538,70
2022	4664	55	€25.106,96	Business	Lower	€11.224,80

## 5 Empirical analyses

### 5.1 Fixed effects analysis

This section presents the empirical analyses employed to address the research question. The hypotheses are evaluated using fixed effects regression analysis. For each hypothesis, two distinct models are used. The first model treats the dependent variable, stock market participation, as a binary variable (i.e., participating or not participating, coded as 1 or 0). The second model treats the dependent variable as a continuous variable, representing the absolute amount invested in the stock market by the respondents. If a respondent did not participate, the value is recorded as zero.

The first two models are used to test **Hypothesis 1**, “Graduates from quantitative fields of study are more likely to participate in the stock market than graduates from non-quantitative fields of study.” These models will test whether respondents who have completed a quantitative field of study (as defined in Appendix A Measurement of variables) are more likely to participate in the stock market compared to those who have completed a non-quantitative field of study.

The second two models are used to test **Hypothesis 2**, “Individuals with higher levels of education are more likely to participate in the stock market compared to those with lower levels of education.” These models assess whether individuals with higher levels of education are more likely to participate in the stock market compared to individuals with lower levels of education, consistent with the findings in existing literature.

Table 2 shows the results from these four fixed effects regression models. The table is divided into two parts: the first treats stock market participation as a binary variable (columns 1 and 3) and the second treats it as a continuous variable (columns 2 and 4).

In the first model (column 1), stock market participation is modeled as a binary variable, indicating whether respondents participate in the stock market (1) or not (0). The coefficients for each field of study show how the probability of participating in the stock market has changed in relation to the reference category, which is “General”. The coefficients thus indicate the change in probability of stock market participation compared to graduates of studies that are classified as general. Positive coefficients indicate a higher likelihood of stock market participation compared to graduates of general studies and negative coefficients indicate a lower likelihood of stock market participation compared to graduates of general studies.

**TABLE 2** FIXED EFFECTS REGRESSION MODELS

<b>Variable</b>	<b>(1) Stock Market Participation (binary)</b>	<b>(2) Stock Market Participation (continuous)</b>	<b>(3) Stock Market Participation (binary)</b>	<b>(4) Stock Market Participation (continuous)</b>
Agriculture	-0.002 (0.022)	-13.858,85 (34.536,44)		
Business	0.011 (0.009)	-9.058,24 (14.143,37)		
Education	0.017 (0.017)	-9.930,02 (25.688,47)		
Healthcare	0.026** (0.012)	-10.663,86 (18.736,55)		
Humanities	-0.019 (0.019)	-6.972,81 (29.899,79)		
Journalism	0.005 (0.014)	-12.724,08 (21.156,03)		
Multiple studies	0.007 (0.008)	-14.281,70 (12.239,14)		
Other	0.009 (0.008)	-8.830,95 (12.531,57)		
Services	0.016* (0.010)	-17.902,05 (14.686,75)		
STEM	0.016 (0.010)	-10.084,86 (15.579,16)		
Unknown	0.002 (0.024)	-4.018,59 (36.529,31)		
Academic			0.047*** (0.013)	1.668,76 (19.803,63)
Middle			0.016** (0.007)	-627,29 (10.987,26)
Other			0.009 (0.011)	-803,76 (17.142,41)
Professional			0.024** (0.010)	-141,99 (15.143,12)
<i>N</i>	40,059	37,799	40,059	37,799
<i>R</i> <sup>2</sup>	0.0004	0.00008	0.001	0.0000008
adj. <i>R</i> <sup>2</sup>	-0.478	-0.496	-0.478	-0.495

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$



The first model shows a statistically significant coefficient for “Healthcare” ( $\beta = 0.026$ ,  $p < 0.05$ ), suggesting that individuals with a background in healthcare are more likely to participate in the stock market compared to graduates from general studies. This may be due to the higher income doctors receive and the higher educational attainment doctors need in order to be active in the field.

The “Services” field of study also shows a positive association, although at a lower level of significance ( $\beta = 0.016$ ,  $p < 0.1$ ). Other fields of study, including the quantitative fields of study agriculture, business, and STEM do not show a significant association with stock market participation. The r-squared value of the model (0.0004) indicates that the fields of study included in the model only explain a very small portion of the variance in stock market participation. The explanatory power of the first model is therefore very limited.

When stock market participation is modeled as a continuous variable (column 2), the results show no significant associations between field of study and the level of investment. This suggests that respondents’ field of study affect the decision to participate in the stock market, but not necessarily the amount invested. Note that the number of respondents ( $N$ ) is lower when stock market participation is modeled as a continuous variable. This is because the respondents who selected “I prefer not to say” and “I don’t know” (which was revised to “Other”) were removed in order to construct stock market participation as a continuous variable.

The third model (column 3), shows the associations between the various education levels and stock market participation. The reference category is the “Lower” education level. The results indicate that having an academic education significantly increases the likelihood of stock market participation ( $\beta = 0.047$ ,  $p < 0.01$ ). Additionally, there are significant positive effects for middle ( $\beta = 0.016$ ,  $p < 0.05$ ) and professional education ( $\beta = 0.024$ ,  $p < 0.05$ ). This is consistent with the findings in the literature, suggesting that higher levels of education are associated with a higher likelihood of participating in the stock market. However, the “Other” education level does not show a significant association with stock market participation ( $\beta = 0.009$ ,  $p = 0.11$ ). This could be the result of respondents’ perceptions of what constitutes “Other” level education.

When stock market participation is modeled as a continuous variable (column 4), the various education levels are not significantly associated with the level of investment. The r-squared value of the model is extremely low (0.0000008). This implies, analogous to model two, that education level does not significantly affects the level of investment.

## 5.2 Hypothesis testing

This section reports on the results when the control variables age and income are also included in the analyses. The set-up is the same as in the previous section, meaning that stock market participation is modeled binary (columns 1 and 3) as well as continuous (columns 2 and 4).

The first model in Table 3 (column 1), shows other results compared to the identical model without the control variables age and income. “Healthcare” again shows a significant positive coefficient ( $\beta = 0.034$ ,  $p < 0.01$ ), indicating that individuals with a healthcare background are more likely to participate in the stock market compared to graduates from general studies, when controlling for age and income. The services field of study is also again significantly associated with stock market participation ( $\beta = 0.022$ ,  $p < 0.05$ ). The quantitative fields of study business and STEM now also become statistically significant ( $\beta = 0.016$ ,  $p < 0.1$ ;  $\beta = 0.018$ ,  $p < 0.1$  respectively). Furthermore, fields of study that are classified as “Other” are now also significantly associated with stock market participation ( $\beta = 0.019$ ,  $p < 0.05$ ). Because both quantitative fields of study and non-quantitative fields of study are significantly associated with participation in the stock market, the first hypothesis is rejected.

In line with the findings of Merkoulova and Veld (2022), age is significantly negatively associated with stock market participation, indicating that older people are less likely to participate in the stock market. In contrast to the existing literature, income has no significant effect on stock market participation. This could be the result of the strong correlation between education level and income.

When stock market participation is modeled as a continuous variable (column 2), the various fields of study show no significant association with the level of investment. These results are therefore the same as in the identical model without control variables. The choice of field of study does not seem to affect the level of investment.

The third model (column 3) shows the same results as in the identical model without control variables. However, the “Professional” education level becomes even more significant ( $\beta = 0.035$ ,  $p < 0.01$ ). Academic education continues to be a strong predictor of stock market participation ( $\beta = 0.064$ ,  $p < 0.01$ ). The second hypothesis can therefore not be rejected.

Finally, the fourth model (column 4) shows the same results as in the identical model without control variables. Education level does not seem to affect the level of investment. The r-squared value is very low (0.00002), indicating a low explanatory power.

**TABLE 3** FIXED EFFECTS REGRESSION MODELS WITH CONTROL VARIABLES

Variable	(1) Stock Market Participation (binary)	(2) Stock Market Participation (continuous)	(3) Stock Market Participation (binary)	(4) Stock Market Participation (continuous)
Agriculture	0.002 (0.022)	-13.400,30 (34.544,87)		
Business	0.016* (0.009)	-8.529,04 (14.167,91)		
Education	0.024 (0.017)	-9.127,59 (25.719,83)		
Healthcare	0.034*** (0.012)	-9.782,22 (18.787,95)		
Humanities	-0.017 (0.019)	-6.672,56 (29.904,38)		
Journalism	0.010 (0.014)	-12.101,55 (21.178,80)		
Multiple studies	0.011 (0.008)	-13.931,33 (12.251,74)		
Other	0.019** (0.008)	-7.805,14 (12.632,86)		
Services	0.022** (0.010)	-17.203,34 (14.727,28)		
STEM	0.018* (0.010)	-9.729,17 (15.589,50)		
Unknown	0.007 (0.024)	-3.410,83 (36.542,87)		
Academic			0.064*** (0.013)	3.753,34 (19.994,97)
Middle			0.018** (0.007)	-453,32 (10.993,00)
Other			0.013 (0.011)	-346,13 (17.154,18)
Professional			0.035*** (0.010)	-1.161,09 (15.242,15)
Age	-0.003*** (0.000)	-350,63 (544,68)	-0.003*** (0.000)	-416,31 (546,69)
Income	0.000 (0.000)	-0,00 (0,02)	0.000 (0.000)	-0,00 (0,02)
<i>N</i>	40,059	37,799	40,059	37,799
<i>R</i> <sup>2</sup>	0.004	0.0001	0.004	0.00002
adj. <i>R</i> <sup>2</sup>	-0.473	-0.496	-0.472	-0.495

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

## 6 Discussion

### 6.1 Conclusion

This study examined the relationship between an individual's field of study and their participation in the stock market within the Dutch context, utilizing data from the LISS panel. The aim was to provide insights into the stock market participation puzzle in the Dutch context, and to understand the role of education level as another independent variable.

The findings indicate that graduates from the non-quantitative fields of study healthcare and services exhibit a significant association with stock market participation. In contrast, graduates from quantitative fields of study such as agriculture, business, and STEM do not exhibit a significant association with stock market participation.

However, when the study includes age and income as control variables in the fixed effects analysis, the findings indicate that graduates from the quantitative fields of study business and STEM exhibit a significant association with stock market participation. Furthermore, graduates from the generic field of study "Other" also exhibit a significant association with stock market participation. As in the analysis without control variables, the healthcare and services fields of study are still significant.

Additionally, the findings indicate that individuals with higher levels of education are more likely to participate in the stock market compared to individuals with lower levels of education. Neither field of study nor education level significantly affects the amount invested in the stock market. It can therefore be said that the field of study may affect the participation decision, but not necessarily the amount invested. A comparable conclusion has been made by Guiso et al. (2003), who investigate stockownership among households in European countries. They argue that education affects the participation decision but not the composition of the portfolio.

The results could have implications for policymakers, educational institutions, and financial advisers. Enhancing financial literacy in fields of study with low stock participation rates (see Appendix B Additional tables) could be an effective strategy to promote financial well-being and potentially increase stock market participation rates. Lusardi and Mitchell (2014) highlight the importance of financial education/literacy for individuals in order to take advantage of products and services that best meet their goals. Because stock market investments typically provide returns

over the long term, it is important that the policy and financial curricula are introduced at a relatively young age to the students (Alhenawi, 2013; Dimson et al., 2002; Lusardi et al., 2017).

## 6.2 Limitations and recommendations for future research

This section discusses several limitations that may affect the interpretation of the findings and suggests topics for future research. It will start with the limitations.

First, the dummy variable “Multiple studies” that was constructed does not specify the types of studies followed by the respondent. Future research could delve deeper into this aspect to better understand the impact of completing multiple studies on stock market participation. It is possible that specific combinations of fields of study are more strongly associated with stock market participation.

Second, the study uses the total value of investments as a proxy for stock market participation. Therefore, the measure includes various types of investments such as bonds, mutual funds and other securities, not only stocks. As a result, the proxy might overestimate the actual stock market participation rates. This limitation should be considered when reading the study’s results and tables.

Third, the data used in the study is self-reported, which can lead to biases such as social desirability bias<sup>14</sup> (Fisher, 1993). Respondents might have inaccurately reported their educational background and investment behavior. However, the availability of options such as “I prefer not to say” and “I don’t know” could have minimized the number of biased responses. Nevertheless, this is a typical limitation when working with survey data.

Fourth, because some panel members did not take part in all three of the study’s modules, the study had to remove a reasonable number of respondents (14% - 23%). If this attrition is non-random, it could skew the results. This was unavoidable, but could be a potential source of bias.

Fifth, the classification of fields of study into quantitative and non-quantitative fields might oversimplify the diversity within each field. For instance, medical students may have a solid foundation in statistics, yet healthcare is still regarded as a non-quantitative field. Additionally, within STEM, there could be a lot of variation in exposure to financial concepts. Engineering

<sup>14</sup> Social desirability bias refers to the tendency of respondents to answer questions in a manner that will be viewed favourably by others (Fisher, 1993).

students, for example, may not be exposed to financial concepts at all, depending on the specific specialization chosen.

Finally, the findings of this study are specific to the Dutch context, given the use of LISS panel as a sample. Cultural and economic factors influencing stock market participation in the Netherlands may differ from those in other countries. These differences must be considered when generalizing the findings to other settings.

Future research could explore the relationship between field of study and participation in various financial instruments separately, such as stocks, bonds, or cryptocurrencies, instead of using the total value of investments as a proxy. This could lead to a better understanding of how field of study affects preferences for different types of investments.

Furthermore, experiments where participants from various fields of study receive different forms of financial education could provide valuable insights. By doing so, researchers can assess whether financial education programs cause stock market participation, rather than just being associated with it. The experiments could help to develop more effective, field-specific financial education programs that prepare individuals for sound financial decision-making and potentially stock market participation.

### **6.3 Policy implications**

The study's results indicate that graduates from business, healthcare, services, STEM, and studies that are classified as "Other" are more likely to participate in the stock market than graduates from other quantitative and non-quantitative fields of study. Policymakers can advocate for the integration of financial education into the curricula of these other fields (i.e., general, education, humanities, journalism, and agriculture). By including basic financial literacy courses in high school and higher education programs, students from all educational backgrounds can acquire the knowledge and skills to make sound financial decisions.

According to Lusardi et al. (2017), people in all educational groups would benefit from receiving financial education early in life (although some groups more than others). They contend that financial education in high school has large effects on wealth accumulation and welfare. Attention can be paid to financial concepts such as compounding interest, inflation, and the time value of money. Borden et al. (2008) found that even a one and a half-hour seminar on financial education could improve students' financial knowledge. Their findings specifically indicate that

students who attended a seminar on basic financial skills increased their savings and investments in the following year.

Additionally, the study's results suggest that individuals with higher levels of education are more likely to participate in in the stock market compared to individuals with lower levels of education. Therefore, policymakers could design targeted financial literacy programs aimed at those with lower education levels. These programs can focus on simplifying complex financial concepts and providing practical investment strategies (e.g., how to buy stocks).

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## Appendix A Measurement of variables

Variable:	Items/categories:	Operationalization:
Field of study – Work and Schooling Wave 16 (Tilburg University, the Netherlands)	<p><i>In what field did you complete your highest level of education? (more than one answer permitted)</i></p> <p><i>Categories: 0. No / 1. Yes</i></p> <ul style="list-style-type: none"> <li>a) General or no specific field (G)</li> <li>b) Teacher training or education (G)</li> <li>c) Art (NQ)</li> <li>d) Humanities (modern or classical languages, history, theology, etc.) (NQ)</li> <li>e) Social and behavioral studies (including organization studies, media, culture, sports and leisure studies, etc.) (NQ)</li> <li>f) Economics, management, business administration, accountancy (Q)</li> <li>g) Law, public administration (Q)</li> <li>h) Mathematics, physics, IT (Q)</li> <li>i) Technology (including architecture, industry, crafts, construction, etc.) (Q)</li> <li>j) Agriculture, forestry, environment (Q)</li> <li>k) Medical, health services, nursing, etc. (NQ)</li> <li>l) Personal care services (home economics, hair dressing school, etc.) (NQ)</li> <li>m) Catering, recreation (NQ)</li> <li>n) Transport, logistics (NQ)</li> <li>o) Telecommunication (Q)</li> <li>p) Public order and safety (police, army, fire brigade, etc.) (NQ)</li> <li>q) Other area (G)</li> </ul>	<ul style="list-style-type: none"> <li>General (G)</li> <li>Education (G)</li> <li>Humanities (NQ)</li> <li>Humanities (NQ)</li> <li>Journalism (NQ)</li> <li>Business (Q)</li> <li>Business (Q)</li> <li>STEM (Q)</li> <li>STEM (Q)</li> <li>Agriculture (Q)</li> <li>Healthcare (NQ)</li> <li>Services (NQ)</li> <li>Services (NQ)</li> <li>Services (NQ)</li> <li>STEM (Q)</li> <li>Services (NQ)</li> <li>Other (G)</li> </ul>
Education level – Work and Schooling Wave 16 (Tilburg University, the Netherlands)	<p><i>What is the highest level of education that you have completed <b>with diploma or certificate</b>?</i></p> <p><i>This can be a day program or a part-time program. Part-time programs (such as evening secondary school) and learn-work programs (such as apprenticeships) also count. Individual courses do not count.</i></p> <p><i>If you were educated abroad, and your education is comparable to one of the listed Dutch programs, please select the (comparable) Dutch education program. If this is not possible, then select the button 'other'. You will then be presented a follow-up question.</i></p> <ul style="list-style-type: none"> <li>1. did not complete any education</li> <li>2. did not complete primary school</li> <li>3. primary school</li> <li>4. lower and continued special education</li> </ul>	<ul style="list-style-type: none"> <li>Lower</li> <li>Lower</li> <li>Lower</li> <li>Lower</li> </ul>

	5. vglo (continued lower education)	Lower
	6. lbo (lower professional education)	Lower
	7. lower technical school, household school	Lower
	8. mulo, ulo, mavo (lower/intermediate secondary education; US: junior high school)	Lower
	9. vmbo vocational training program (preparatory intermediate vocational school)	Lower
	10. vmbo theoretical or combined program (preparatory intermediate vocational school)	Lower
	11. mms (intermediate girls' school)	Lower
	12. hbs (former pre-university education, US: senior high school)	Lower
	13. havo (higher general secondary education; US: junior high school)	Middle
	14. vwo (pre-university education, US: senior high school)	Middle
	15. gymnasium, atheneum, lyceum (types of pre-university education programs)	Middle
	16. kmbo (short intermediate professional education), vhbo (preparatory higher professional education)	Middle
	17. mbo professional training program (intermediate professional education) (BOL)	Middle
	18. mbo professional training program (intermediate professional education) (BBL)	Middle
	19. mbo-plus to access hbo, short hbo education (less than two years) (higher professional education)	Middle
	20. hbo (higher professional education), institutes of higher education, new style	Profession
	21. teacher training school	Profession
	22. conservatory and art academy	Profession
	23. academic education (including technical and economic colleges, former style) bachelor's degree (kandidaats)	Academic
	24. academic education (including technical and economic colleges, former style) master's degree (doctoraal)	Academic
	25. academic education, bachelor	Academic
	26. academic education, master	Academic
	27. doctor's degree (Ph.D, including doctoral research program to obtain Ph.D)	Academic
	28. other	Other

<p>Stock market participation – Economic Situation: Assets Wave 8 (Tilburg University, the Netherlands)</p>	<p><i>What was the total value of your investments (growth funds, share funds, bonds, debentures, stocks, options, warrants) on 31 December ....? (Please note: written options represent a debt, and in case of a negative balance, please add a minus sign before the amount.)</i></p> <p>Please enter whole numbers (whole Euros) only, so without decimal points or commas.</p>	<p>Yes (1), No (0)</p>
<p>Income – Economic Situation: Income Wave 1 (Tilburg University, the Netherlands)</p>	<ul style="list-style-type: none"> <li>a) Gross wages</li> <li>b) Fiscal profit (gross income minus freelancer expenses)</li> <li>c) Gross VUT (early retirement)</li> <li>d) Gross AOW (state pension)</li> <li>e) Gross amount of other pensions</li> <li>f) Gross life annuities</li> <li>g) Gross Sickness Benefit Act</li> <li>h) Gross Unemployment Benefits Act or follow-up unemployment benefit</li> <li>i) Gross amount of half-pay (Dutch: wachtgeld)</li> <li>j) Gross Surviving relatives pension (from a pension fund or insurer)</li> <li>k) Gross orphan’s pension (from a pension fund or insurer)</li> <li>l) Gross Work and Assistance Act</li> <li>m) Gross Supplementary benefit for self-employed persons</li> <li>n) Gross Act on Income Provisions for Older or Partially Disabled Unemployed Persons/Formerly Self-Employed Persons</li> <li>o) Gross Income Provision Scheme for People Fully Occupationally Disabled; the successor to WAO: Disability Insurance Act, for fully occupationally disabled persons</li> <li>p) Gross Return to Work Scheme for the Partially Disabled; the successor to the WAO for partially occupationally disabled persons</li> <li>q) Gross invalidity pension (from a pension fund or insurer)</li> <li>r) Net General Child Benefit Act</li> <li>s) Net Healthcare Benefit, paid through the Tax Administration</li> <li>t) Income from real estate (including renting out rooms)</li> <li>u) Income through the house ownership grant</li> <li>v) Income through student grant</li> <li>w) Income through student loan</li> <li>x) Alimony from ex-spouse</li> <li>y) Alimony for children</li> <li>z) Study allowance from parents</li> </ul>	

	<ul style="list-style-type: none"><li>aa) Allowances from family</li><li>bb) Income through share dividends, stocks, investment accounts or investment funds</li><li>cc) Income through interest from savings accounts, receivables, stocks, bonds, debentures or investment accounts</li><li>dd) Legacies or gifts</li><li>ee) Income from former work</li><li>ff) Gross income from clothing / pocket money</li><li>gg) Gross income from the lottery</li><li>hh) Gross income from expenses remuneration</li><li>ii) Gross income from severance pay</li><li>jj) Gross income from the allowance for representation</li><li>kk) Gross income from royalties</li><li>ll) Gross income from damages compensation</li><li>mm) Gross income from trainee compensation</li><li>nn) Gross income from tax or social premiums reimbursement</li><li>oo) Gross income from voluntary work compensation</li><li>pp) Gross other forms of income</li></ul>	
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## Appendix B Additional tables

**TABLE 4** RESPONDENT ATTRITION STATISTICS

<b>Year</b>	<b>Number of respondents removed</b>	<b>Total amount of respondents</b>	<b>Percentage removed</b>
2008	1564	6949	23%
2010	1314	6365	21%
2012	873	6013	15%
2014	1167	6568	18%
2016	1020	5832	17%
2018	1105	5831	19%
2020	766	5646	14%
2022	1111	5775	19%



**TABLE 5** RESPONSE RATES MODULES

<b>Year</b>	<b>Work and Schooling</b>	<b>Economic Situation: Assets</b>	<b>Economic Situation: Income</b>
2008	80.9%	64.9%	69.4%
2010	73.4%	69.3%	69.9%
2012	80.5%	75.2%	77.6%
2014	82.6%	83.1%	78.9%
2016	87.8%	83.6%	81.5%
2018	80.4%	85.2%	80.3%
2020	81.9%	84.7%	82.3%
2022	83.5%	80.0%	78.0%

**TABLE 6** STOCK MARKET PARTICIPATION RATES FOR THE YEAR 2008

<b>Variable</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Minimum</b>	<b>Maximum</b>
Stock market participation	18%	0,38	0	1
<b>Field of study:</b>				
- Agriculture	22%	0,41	0	1
- Business	25%	0,43	0	1
- Education	21%	0,40	0	1
- General	13%	0,33	0	1
- Healthcare	16%	0,36	0	1
- Humanities	11%	0,31	0	1
- Journalism	16%	0,37	0	1
- Multiple studies	20%	0,40	0	1
- Other	10%	0,30	0	1
- Services	12%	0,32	0	1
- STEM	21%	0,41	0	1
- Unknown	2%	0,15	0	1
<b>Education level:</b>				
- Academic	37%	0,48	0	1
- Lower	11%	0,31	0	1
- Middle	16%	0,37	0	1
- Other	17%	0,38	0	1
- Professional	26%	0,44	0	1

**TABLE 7** STOCK MARKET PARTICIPATION RATES FOR THE YEAR 2010

<b>Variable</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Minimum</b>	<b>Maximum</b>
Stock market participation	15%	0,36	0	1
<b>Field of study:</b>				
- Agriculture	27%	0,44	0	1
- Business	21%	0,41	0	1
- Education	18%	0,38	0	1
- General	11%	0,32	0	1
- Healthcare	15%	0,35	0	1
- Humanities	16%	0,36	0	1
- Journalism	14%	0,35	0	1
- Multiple studies	21%	0,41	0	1
- Other	8%	0,27	0	1
- Services	11%	0,31	0	1
- STEM	18%	0,39	0	1
- Unknown	3%	0,16	0	1
<b>Education level:</b>				
- Academic	32%	0,47	0	1
- Lower	10%	0,30	0	1
- Middle	12%	0,33	0	1
- Other	17%	0,38	0	1
- Professional	24%	0,43	0	1

**TABLE 8** STOCK MARKET PARTICIPATION RATES FOR THE YEAR 2012

<b>Variable</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Minimum</b>	<b>Maximum</b>
Stock market participation	14%	0,35	0	1
<b>Field of study:</b>				
- Agriculture	26%	0,44	0	1
- Business	19%	0,39	0	1
- Education	18%	0,39	0	1
- General	9%	0,28	0	1
- Healthcare	12%	0,32	0	1
- Humanities	11%	0,32	0	1
- Journalism	13%	0,34	0	1
- Multiple studies	19%	0,39	0	1
- Other	8%	0,27	0	1
- Services	10%	0,30	0	1
- STEM	16%	0,37	0	1
- Unknown	3%	0,17	0	1
<b>Education level:</b>				
- Academic	30%	0,46	0	1
- Lower	8%	0,27	0	1
- Middle	11%	0,32	0	1
- Other	16%	0,37	0	1
- Professional	22%	0,42	0	1

**TABLE 9** STOCK MARKET PARTICIPATION RATES FOR THE YEAR 2014

<b>Variable</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Minimum</b>	<b>Maximum</b>
Stock market participation	13%	0,34	0	1
<b>Field of study:</b>				
- Agriculture	21%	0,41	0	1
- Business	18%	0,39	0	1
- Education	17%	0,38	0	1
- General	7%	0,26	0	1
- Healthcare	10%	0,30	0	1
- Humanities	15%	0,36	0	1
- Journalism	14%	0,34	0	1
- Multiple studies	16%	0,37	0	1
- Other	7%	0,26	0	1
- Services	9%	0,29	0	1
- STEM	16%	0,37	0	1
- Unknown	0%	0,00	0	0
<b>Education level:</b>				
- Academic	27%	0,45	0	1
- Lower	8%	0,28	0	1
- Middle	10%	0,30	0	1
- Other	12%	0,32	0	1
- Professional	20%	0,40	0	1

**TABLE 10** STOCK MARKET PARTICIPATION RATES FOR THE YEAR 2016

<b>Variable</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Minimum</b>	<b>Maximum</b>
Stock market participation	13%	0,33	0	1
<b>Field of study:</b>				
- Agriculture	19%	0,40	0	1
- Business	19%	0,39	0	1
- Education	13%	0,34	0	1
- General	8%	0,27	0	1
- Healthcare	10%	0,29	0	1
- Humanities	20%	0,40	0	1
- Journalism	16%	0,36	0	1
- Multiple studies	14%	0,35	0	1
- Other	7%	0,26	0	1
- Services	5%	0,22	0	1
- STEM	16%	0,37	0	1
- Unknown	0%	0,00	0	0
<b>Education level:</b>				
- Academic	26%	0,44	0	1
- Lower	8%	0,27	0	1
- Middle	9%	0,28	0	1
- Other	14%	0,35	0	1
- Professional	18%	0,38	0	1

**TABLE 11 STOCK MARKET PARTICIPATION RATES FOR THE YEAR 2018**

<b>Variable</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Minimum</b>	<b>Maximum</b>
Stock market participation	14%	0,35	0	1
<b>Field of study:</b>				
- Agriculture	21%	0,41	0	1
- Business	21%	0,40	0	1
- Education	17%	0,38	0	1
- General	8%	0,27	0	1
- Healthcare	12%	0,33	0	1
- Humanities	18%	0,38	0	1
- Journalism	15%	0,35	0	1
- Multiple studies	16%	0,37	0	1
- Other	9%	0,29	0	1
- Services	8%	0,27	0	1
- STEM	17%	0,38	0	1
- Unknown	0%	0,00	0	0
<b>Education level:</b>				
- Academic	27%	0,44	0	1
- Lower	8%	0,27	0	1
- Middle	11%	0,32	0	1
- Other	14%	0,35	0	1
- Professional	19%	0,39	0	1

**TABLE 12** STOCK MARKET PARTICIPATION RATES FOR THE YEAR 2020

<b>Variable</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Minimum</b>	<b>Maximum</b>
Stock market participation	14%	0,35	0	1
<b>Field of study:</b>				
- Agriculture	18%	0,38	0	1
- Business	19%	0,39	0	1
- Education	17%	0,38	0	1
- General	8%	0,27	0	1
- Healthcare	11%	0,32	0	1
- Humanities	18%	0,38	0	1
- Journalism	17%	0,38	0	1
- Multiple studies	17%	0,38	0	1
- Other	9%	0,28	0	1
- Services	8%	0,27	0	1
- STEM	19%	0,39	0	1
- Unknown	0%	0,00	0	0
<b>Education level:</b>				
- Academic	27%	0,45	0	1
- Lower	8%	0,27	0	1
- Middle	10%	0,30	0	1
- Other	9%	0,28	0	1
- Professional	20%	0,40	0	1



**TABLE 13** STOCK MARKET PARTICIPATION RATES FOR THE YEAR 2022

<b>Variable</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Minimum</b>	<b>Maximum</b>
Stock market participation	18%	0,38	0	1
<b>Field of study:</b>				
- Agriculture	18%	0,39	0	1
- Business	26%	0,44	0	1
- Education	17%	0,37	0	1
- General	11%	0,31	0	1
- Healthcare	15%	0,36	0	1
- Humanities	23%	0,42	0	1
- Journalism	21%	0,41	0	1
- Multiple studies	20%	0,40	0	1
- Other	12%	0,32	0	1
- Services	11%	0,31	0	1
- STEM	23%	0,42	0	1
- Unknown	4%	0,19	0	1
<b>Education level:</b>				
- Academic	35%	0,48	0	1
- Lower	9%	0,29	0	1
- Middle	12%	0,32	0	1
- Other	12%	0,32	0	1
- Professional	24%	0,43	0	1