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Working Paper, No. 236/2024

Editors:

Sigrid Betzelt, Eckhard Hein, Martina Metzger, Martina Sproll, Christina Teipen,
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Is There No *Women* in Investment?

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Abstract:

As European pension systems are struggling to provide financial security in retirement under the pressure of demographic change, poverty in old age disproportionately affects women. Given these developments, private investment is becoming ever more important to securing financial means after retirement. Therefore, this paper investigates *which factors determine female and male investment behaviour in Germany regarding different asset classes?* It is hypothesised that (i) differences in investment behaviour are mainly driven by wealth and income. (ii) However, even after controlling for income, there are still gender differences in investment behaviour.

We conduct a thorough literature review and empirical analysis based thereon, using the 2017 data wave of the ECB's Household Finance and Consumption Survey (HFCS) for German single households. Controlling for selected socio-economic variables, we find that women have significantly less holdings in risky assets. This observation holds even when adding gross household income as further control variable. However, no difference between male and female investment behaviour can be detected in relatively risk-free asset classes.

The findings in this paper contribute to existing and future research - its literature points out the ambiguity and lack of coherence in existing research in the topic of gendered investment behaviour. Further, its empirical analysis provides new insights using the updated 2017 HFCS dataset, with most previous research based on 2010/14 HFCS data. Lastly, we are drawing attention to the unequal strategies of wealth accumulation between men and women and their ramifications for wealth distribution providing important contextualisation for future policy-making.

Keywords: Gender, Inequalities, Finance, Portfolio Choices, Assets, HFCS.

JEL codes: D31, G11, J16

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Acknowledgements: This is a revised version of a group seminar paper. We thank Professor Martina Metzger for her insightful comments and support. We are also grateful to the ECB for providing access to the data required for this paper and kindly agreeing to its publication. This paper was presented at the 2024 International Women's Day Conference in Economics, Finance and Management hosted by the University of Economics in Katowice. We thank all participants of the panel for their helpful comments and insights. Any errors remaining are of course ours. This paper won the Best Paper Award at the 2024 International Women's Day Conference. We thank the prize committee and all anonymous referees for this recognition. Further thanks are extended by Ms. Dylla to Université Paris Cité for providing funding and support via the SMARTS-Up scholarship for the academic year 2023/24.

1. Introduction

The phenomenon of poverty after retirement has been affecting women in particular. According to existing literature, the main causes thereof have been both the uneven participation of women and men in the labour market and the gender wage gap (e.g. Roig & Maruichi, 2022). Additionally, with the ever-ageing demographic in most Organisation for Economic Cooperation and Development (OECD) countries, private investments will be an increasingly important supplement to public pension schemes, in ensuring sufficient financial security after retirement, thus preventing poverty in old age (e.g. OECD, 2014). However, it is contested whether there are gendered differences in investment behaviour that might further expose women to the risk of poverty after retirement. Learning more about the social and economic factors driving investment is fundamental to understanding the reasons behind women's poverty in old age. Only then can policymakers address these factors and provide more equal opportunities for men and women to ensure their financial security generally throughout life and in old age. To note, gender differences henceforth must be understood merely as differences between women and men, as there are significant limitations in existing research and data collection with regards to other forms of gender. Secondly, the reader should note that this paper uses the terms portfolio decisions and investment decisions interchangeably if not indicated otherwise. Hence, investment decisions in the understanding of the following analysis refer to choices regarding portfolio composition made by an individual on a microeconomic level rather than private businesses' investment in a macroeconomic understanding. This is mostly in order to maintain consistency with previous literature on this topic which often refers to gender differences in investment behaviour (see for example Croson & Gneezy, 2009 or Schneebaum et al., 2018).

Therefore, this paper will investigate the following research question: *Which factors determine female and male investment behaviour in Germany regarding different asset classes?* This paper hypothesises that (i) differences in investment behaviour are mainly driven by wealth and income. (ii) However, even after controlling for income, there are still gender differences in investment behaviour.

This paper aims to contribute to the existing research in four ways. First, while there is sufficient literature on gendered investment behaviour, there are few articles providing a coherent review thereof. This is particularly necessary as the existing research on gender differences in investment behaviour comes to contradictory results and the debate is by no means concluded.

Second, while the majority of previous research has been based on the 2010/14 Household Finance and Consumption Survey (HFCS) data provided by the European Central Bank (ECB), this paper's empirical analysis might provide new insights using the updated 2017 HFCS dataset, which is the most current HFCS dataset at the time of writing. To contribute a comparative analysis across different points in time would be valuable to the topic at hand, this would, however, be outside the scope of this paper. The main reasons for this paper's focus on Germany are that first, the unexplained gross gender wealth gap is rather elevated with 45% in Germany compared to other European Union (EU) countries (only Greece has a higher gap with 48%). Further, both the raw gender earnings gap and the gender wealth gap for single households are highest in Germany, the former being 33% and the latter being 49% (Schneebaum et al., 2018). This emphasis on single households is relevant, mainly because the HFCS data is being collected not on an individual but on a household level. Thus, in the analysis of gender and investment behaviour using the HFCS, one can only include single households. Therein, the gender of the household's reference person (who is also clearly in control of the finances) can be definitively determined. The focus on Germany is thus the third way this paper contributes to the existing literature as it aims to further explain the notable lagging behind of the country in the European context in terms of an equitable gender wealth distribution. From this follows the fourth contribution of this paper. Our research demonstrates the importance of collecting further gender-segregated data on wealth and asset holdings. Similar to previous literature, our analysis is limited by the aggregation of HFCS data at the household level which allows us to make tentative conclusions only. Working with gender segregated data, specifically also within married couples, in the future will be vital to assessing the true extent of gendered differences in investment behaviour and their possible ramifications for women's financial security.

To answer the aforementioned research question, this paper proceeds as follows. Section 2 first provides a literature review on the topic of gender and investment behaviour including previous insights from experimental as well as macro-level studies. Section 3 provides a more detailed description of the data used for our empirical analysis as well as the methodology employed in this paper. The results thereof will be presented in Section 4, followed by a discussion of unexpected findings and the limitations faced in Section 5. Finally, Section 6 concludes and provides an outlook for further possible research.

2. Gender and Investment Behaviour in Previous Literature

In the following, the aspect of gender and investment behaviour in previous literature will be examined. Both aggregated and experimental studies will be elaborated on, specifically analysing risk preferences and risk self-assessment first, a traditionally frequent aspect of research. Thereafter, further concepts in the research will be examined, such as financial literacy and self-efficacy, familiarity regarding investment options, as well as confidence and optimism. Finally, the relevance of an investor's relationship status and the effect of different investment behaviours on the accumulation of wealth will be assessed. To conclude, four papers will be discussed, which review some of the aforementioned research and showcase the ambiguous results therein. This literature review will inform the methodology of this paper with regard to hypothesis and choice of variables for the regression analysis.

Among the first to investigate gender differences in investment behaviour, specifically focusing on *risk preferences*, were Jianakoplos and Bernasek (1998). The authors examine a sample of 3,143 United States (US) households in 1998 and conclude that women invest less in risky assets compared to single men or couples. They show that there is a noteworthy change in investment behaviour for households when their wealth increases from 20,000 USD to 100,000 USD. While the share held in risky assets increases for both men and women, it increases significantly more for men. They assert that this is “evidence of greater risk aversion by women” (Jianakoplos & Bernasek, 1998, p. 625). Interestingly, they also find that single black women and the less educated tend to have riskier investment behaviour: “Single black women are predicted to hold the largest proportion of risky assets – 58%, compared to 49% and 42% for single black men and married black couples, respectively” (Jianakoplos & Bernasek, 1998, p. 627). This ultimately redirects the explanatory focus away from genetics towards cultural differences. To note, the conclusions from this 1998 study can be questioned in their relevance for current studies on the investment behaviour of both genders, since it was published over 25 years ago.

Barber and Odean (2001) published an influential paper, in which they analysed common stock investments of males and females (using trading records from 35,000 households) from February 1991 to January 1997 in the US. The authors were motivated by their observance of a high volume of trading which they found difficult to align with the traditional economic notion of the rational investor. In particular, the authors ascertain that differences in female and male risk preferences impact men's and women's portfolio allocation. Barber and Odean (2001) find that women hold less risky positions in their portfolios than men. Further, while both genders

earn similar gross and net returns on their portfolios, men do so by investing in smaller stocks with higher risk. However, it should also be noted that, according to the authors, men's higher risk preferences do not necessarily play out to their advantage. On the contrary, Barber and Odean (2001) emphasise that both men and women hurt their returns through trading. However, as men have a higher turnover rate, they reduce their returns by 0.94 percentage points more per year than women do.

Further, Chang (2010, chapter 5) investigates why women are less likely to hold risky assets than men. The author cites previous research which indicates that men are generally more willing to take risks. However, Chang (2010) also emphasises that women often perform better than men when making investment decisions. The author suggests that this difference in performance is due to women being more likely to conduct thorough research, seek out bargains and professional advice, and trade less often than men. Investigating the reasons behind these differences in investment behaviour, Chang (2010, chapter 5) runs a multivariate regression looking at cash accounts, homes, stocks, investments in real estate, and business assets. For this purpose, she uses the 2004 Survey of Consumer Finances for persons aged 18 to 64, provided by the Federal Reserve Board. The author finds that, even if men and women were identical with respect to aspects such as income, risk tolerance, participation in the labour force, and education, women would still remain more likely to hold relatively secure cash accounts and less likely to own business accounts which are perceived as risky assets. Yet, when controlling for these factors, there do not seem to be gender differences in home ownership, stocks, or investment in real estate (Chang, 2010, chapter 5).

Whether the willingness to take investment risk is a sex-linked trait has been further the focus of a study conducted by Barasinska and Schäfer (2013). The authors study Austria, the Netherlands, Spain, and Italy and use national household finance and/or income and wealth surveys from 2004 for Austria, the Netherlands, and Italy, and a 2005 survey for Spain. In doing so, Barasinska and Schäfer (2013, following Akerlof & Kranton, 2000) claim that risk-inclined women in a society with asymmetric gender roles, where risky investments are considered to be a male trait, may find it optimal to behave more risk-averse than they truly are. Based on this framework, Barasinska and Schäfer (2013) hypothesise that in societies with distinct gender roles, men and women with equal risk preferences will nonetheless display differences regarding their actual risk-taking. The authors measure risk-taking regarding investment behaviour in two dimensions. An individual's participation decision determines whether they are at all willing to invest in assets classified as risky. In a second step, the allocation decision

determines which part of their portfolio an individual will devote to risky assets, once the participation decision has been made. Regarding the former, Barasinska and Schäfer (2013) find no effect of gender in Austria, Spain, and the Netherlands while the participation decision is indeed impacted by gender in Italy. Concerning the allocation decision, the authors state that gender does not play a decisive role in any of the four countries analysed. Therefore, Barasinska and Schäfer (2013) conclude that using gender as a predictor for the willingness to invest in risky assets is far too simplistic. Hence, the authors caution to provide financial advice based on the investor's gender, particularly in countries with a relatively high level of gender equality.

In the vein of risk preferences, other scholars highlight the role of *risk self-assessment* in investors' behaviour. Badunenko et al. (2010) for example examine the 2004 data collection survey conducted by the Socio-Economic Panel (SOEP) - a dataset investigating over 8,000 private German households, of which 4,829 (59%) are male-led and 3,291 (41%) are female-led. The authors acknowledge that women are traditionally assumed to be more risk-averse than men. They further recognise that females generally rank their willingness to take risks lower than males. However, Badunenko et al. (2010) insist that this difference in *self-assessment* does not prove risk-aversion to be an inherently female characteristic. Rather, the authors postulate this difference to be influenced by a variety of socioeconomic factors, namely as in Dohmen et al. (2011), by gender, age, height, education of parents, relationship status, children, and religion. Then, based on a regression analysis, Badunenko et al. (2010) claim that men and women would be equally likely to conduct risky investments if only they disposed of the same financial resources. In this vein, the authors highlight that female investors generally have a smaller budget than their male counterparts. Thereby, the female self-assessment of a preference for more secure financial products is not a consequence of an inherently female trait, but rather due to the lower assets at the disposal of women relative to men. Therefore, the authors conclude that the difference in funds and not gender is the main factor causing women to invest in relatively fewer risky assets than men (Badunenko et al., 2010).

The aspect of risk preferences has traditionally informed and shaped the research on investment behaviour substantially, but as has been discussed, the takeaways are varied and remain relatively inconclusive. Therefore, before circling back on this issue and dedicating some focus on this aspect in our empirical analysis in Section 3, further relevant features in the literature will be reviewed.

First, *financial literacy/knowledge* plays an important role in the research by Alessie et al. (2017), among others. The authors investigate panel household data – for the US and Germany

from 2009, and for the Netherlands from 2010 – which include three basic questions about finance and investment. They demonstrate that women are less financially literate than men across all three countries. This cleavage prevails even when controlling for relationship status, income groups, education, and age. In marriage, even if women indicate that they are the sole decider on finance, they are less financially literate than their male counterparts. Another paper that is frequently quoted when confirming differences in investment behaviour and risk aversion between men and women is Lusardi and Mitchell (2008). Works by Schneebaum et al. (2018), as well as Sierminska (2017), and Grabka et al. (2015) (which will be presented further subsequently) all interpret that this 2008 paper confirms that women have less *financial knowledge* and that women tend to invest more conservatively than men. Again, the characteristics of Lusardi and Mitchell’s (2008) research, however, call for caution in interpreting the results. The authors analysed the 2004 Health and Retirement Survey (HRS) module on retirement planning and literacy. They thus examine a sample of 785 women who are at least 50 years old. Lusardi and Mitchell (2008) conclude that older women in the US have very low levels of financial literacy compared to the older population as a whole. As this paper analyses the US and the financial planning behaviour of a relatively small sample of women in 2004, the paper’s relevancy for our analysis remains relatively limited. Finally, Grabka et al. (2015) mention Fonseca et al. (2012), who find that there are gender differences in financial literacy even after controlling for sociodemographic characteristics. The reason, however, is that men acquire financial knowledge because they specialise in making household financial decisions, while women specialise in other household functions. “Our results suggest that with approximately equal education achievement by gender, financial decision making should also be approximately equal by gender, although within, an individual household, it will depend upon the relative levels of the spouses” (Fonseca et al., 2012, p. 105).

Another aspect, relevant in the investment behaviour literature, is *financial self-efficacy* (FSE). This is the focus of Montford and Goldsmith (2016), who verify that FSE is crucial in understanding female/male investment decisions. FSE is defined as “the belief in one’s capability in achieving one’s ultimate financial goals” (Montford & Goldsmith, 2016, p. 102). It is influenced by the level of financial literacy and financial skills, but importantly also by factors such as “personality, family history, social and cultural norms and frames of reference” (p. 102). In their study examining 182 US students (of which 64% are female), they conclude that if a variable capturing self-efficacy is included, gender is no longer a significant variable.

Along with FSE, Prast et al. (2015) illuminate the role of *familiarity* as an explanatory variable to the aggregated differences between male and female stock market participation. The authors' data stems from a Dutch internet survey by the Tilburg University ("CentERpanel") including 2,000 representative households in 2013. As part of the CentERpanel, members are presented with the choice to allocate wealth investment in government bonds and one of two mock portfolios – one consisting of companies featured in women-targeting magazines, the other one containing companies from the stock market index. Their regression can only ascertain a positive effect of familiarity in favour of stocks for women above 60, which might be caused by the selection of firms in the "pink" portfolio from magazines – a medium less used by younger women.

Another aspect of explaining differences in investment behaviour between women and men is *confidence*, which is highlighted in Bollen and Posavac's (2018) experimental study. This work exemplifies the ambiguity in the research regarding male and female risk preferences. Graduate business students as well as financial professionals were tasked with designing an investment recommendation for a mock client. Female and male students demonstrated diverging investment recommendations, while the professionals had an insignificant gender difference. In addition, the professionals invested more in risky assets on average. This indicates a self-selection of more risk tolerant individuals along a career path in finance. This result could also support the argument that confidence through financial literacy, as well as training and experience, increases the risk tolerance.

Besides treating the aspect of risk preferences, the aforementioned paper by Barber and Odean (2001) also puts forward the phenomenon of *overconfidence* which, especially in areas such as finance, is much more predominant among men than women. Drawing on their findings, the authors derive two falsifiable hypotheses. First, men are expected to be trading more than women. Second, by trading more, the authors expect men to negatively impact their returns more than women do (Barber & Odean, 2001). Throughout their analysis, the authors find empirical evidence consistent with these hypotheses. Barber and Odean (2001) note that women turn over their portfolios at approximately 53% on an annual level while men do so at 77%. Moreover, the authors claim that this difference in investment behaviour is greatest between single men and women as their decision is not influenced by a partner of the other sex. These findings hold even when performing a cross-sectional regression, considering demographic characteristics known to affect financial decision-making such as income, marital status, and

the presence of children (Barber & Odean, 2001). This further indicates that there is gender-differences that constitute a determining factor in investment behaviour.

Now, besides the features of financial literacy, FSE, familiarity, and (over)-confidence, *optimism* seems to be another explanatory part of differences in investment behaviour between genders. Jacobsen et al. (2014) explore the traditional argument made in investment theory, that it should be expectations regarding market performance, which drive investors' spirit. Hence, Jacobsen et al. (2014) statistically ascertain that optimists invest more than pessimists and that, on average, men are more optimistic. The authors analyse data from 1978 to 2005 provided by the University of Michigan Consumer Sentiment Index, which is based on a monthly survey that includes a sample size of 500. Besides the traditional explanation for why women invest less in stocks than men do - the higher risk aversion - the authors assert that optimism is a significant explanation for the differences in investment behaviour between genders. After accounting for optimism, no statistically significant difference between male and female investment can be found. Of course, optimism is a quite superficial concept. Moreover, Jacobsen et al. (2014) do not offer an argument explaining the different optimism levels.

The last two aspects that significantly feature in previous research are the *relationship status* and the connection between investment behaviour and *wealth accumulation*. Regarding the *relationship status*, particularly in the past, marriage was an indicator for children which might influence risk tolerance and ultimately investment decisions. Also, the division of tasks within a married household could result in men taking over the household's financial decisions (e.g. Fonseca et al., 2012). Studies show divergent results regarding the question of whether marriage is considered to be a "safe asset", such that it induces married women to invest in more risky assets (Bertocchi et al., 2011) or whether it is a financial and another burden (Nutz, 2022; Radenacker, 2020).

Bertocchi et al. (2011) utilise panel data for Italy from 1989 to 2006 to provide empirical insights. They argue that marriage is a safe asset - or financial cushion - because it allows women to seize a part of the gender pay gap. Since single women do not have this safe asset available, they invest less in risky assets than their married counterparts. The rising share of women in the labour market decreased the gender wage gap. Simultaneously, during the extensive period covered in the empirical analysis, the occurrence of divorces has significantly increased. Both of these aspects have arguably rendered the aspect of financial safety in marriage less effective. Nutz (2022) examines the asset holding behaviour of women within couples. The author analyses SOEP data from 2002 to 2017 and investigates female

employment-marriage biographies in Western Germany. She finds that the distinction between solely and jointly held assets is relevant for the personal gross wealth within a couple. While holding assets jointly in a marriage can enable larger investments or facilitate the wealth distribution between partners, it also entails the risk of undesired economic dependency on the partner. Further on marriage as a potential risk, it might not be the union per se that signifies a risk for women, but rather what happens when this union dissolves. Radenacker (2020) asserts that because many married women withdraw completely from the labour market or are only part-time employed, the earnings of divorced women are 40% lower than those of divorced men. While a gender pay gap does not only apply to divorced people, marriage can potentially entail a financial risk, especially for women, as it is a relevant factor in women's decision-making regarding their employment situation, children, and financial dependency.

Schneebaum et al. (2018), Metzger and Young (2020), as well as Sierminska (2017), treat the aspect of *wealth accumulation* differences between women and men. Schneebaum et al.'s (2018) reference to the work by Neelakantan and Chang (2010), further exemplifies the doubts regarding gender differences in investment behaviour and risk preferences. Schneebaum et al. (2018) analyse the wealth gap between female and male single households in eight European countries (including Germany) using the 2010 HFCS data collection. While the authors do not specifically analyse differences in investment behaviour, they do examine gender differences in wealth accumulation, wherein saving from capital income (thus financial investment) is relevant. The authors focus their analysis on single households, where the reference person is of working age (25-60). They thus examine a full sample of "36,362 households, of which 5,188 are single households (2,808 female and 2,380 male)" (Schneebaum et al., 2018, p. 301-302). The authors refer to the Neelakantan and Chang (2010) paper which analyses the HRS data of 2006 and specifically shows that retirement wealth is a function of earned income and risk aversion. The authors assert that there is a gender wealth gap in the US even when accounting for differences in risk preferences, wherein thus an unexplained wealth gap remains concerning.

Metzger and Young (2020) provide a tentative confirmation of gender differences in investment behaviour. They mention the complication inherent to the HFCS data, in determining the decision-making power within a household and the intra-household distribution of wealth. While not definitively confirming a gendered difference in investment behaviour, the authors note that there are gender differences concerning other factors. They claim that it is safe to assume that women *accumulate* less *wealth* and income because they are more often single parents with lower education levels. The correlation here is that the lower an individual's

education level is, and the lower their income, the lower is also the opportunity to invest in risky financial assets and ultimately accumulate wealth.

Finally, in a European Commission report on “Wealth and Gender in Europe”, Sierminska (2017) examines the sources of the differences in wealth between women and men in 15 European countries, with data from the 2010 HFCS. Among others, like diverging saving behaviour and different access to wealth building tools, Sierminska (2017) also states that differences in investment behaviour are causing different wealth levels between men and women.

While all the above are relevant aspects when examining the reasons for the differences in investment behaviour between women and men, a consensual reasoning has not been established thus far. This becomes even clearer with the papers by Croson and Gneezy (2009) and Nelson (2015), which review the aforementioned literature, as well as Fillippin and Crosetto (2014) and Charness and Gneezy (2012), who review some of the empirical approaches in this line of research.

Croson and Gneezy (2009) analyse ten previous studies (from 1988 to 2008) which focused on gender differences in risk taking. They conclude that women are indeed more risk-averse than men and that there are differences in investment behaviour between genders. While Nelson (2015) also critically reviews a collection of previous literature and research on the topic, she concludes differently. The paper analyses four recent studies since 2009, four older ones from the 1990s, and 19 studies where the statistics were available such that the author was able to do calculations to countercheck the derived conclusions. The author asserts that “the statement ‘women are more risk averse than men’ tends to be understood as saying that men and women differ in some substantively important and essential way, by virtue of their sex” (Nelson, 2015, p. 581). She further relativises, however, that when critically reviewing the literature, one can see that this is not supported by actual empirical evidence. This misinterpretation is often due to a lack of statistical significance, an exaggeration of the results, or a partial disregard for important cultural and framing influences that contribute to “the observations of differences both between and within the sexes” (Nelson, 2015, p. 581).

Finally, Charness and Gneezy (2012), as well as Fillippin and Crosetto (2014) review the state-of-research in experimental literature targeting female/male investment and risk. While the former paper reaffirms the notion of gender-driven investment differences, Filippin and Crosetto (2016) do not. Because the academic task of producing robust empirics is challenging,

the authors reconstruct the data of the examined studies to evaluate the empirical methods and demonstrate that the results (strength of gender differences observed) differ along the methodology. In particular, the exclusion of safe options alongside the risky ones appears to be an important aspect in observing gender differences. Hence, no definite empirical conclusion on the effect of gender on investment and risk-taking exists.

Returning to our research question - Which factors determine female and male investment behaviour in Germany regarding different asset classes? - the answers provided by the numerous studies that analyse possible differences between genders regarding investment behaviour and risk aversion remain ambiguous. While some argue that women are inherently less prone to taking financial risks (e.g. Chang, 2010, chapter 5; Barber & Odean, 2001), others emphasise socioeconomic factors that differ between men and women and, thus, result in different risk preferences between the two genders. One frequent argument in this vein is the lower income and wealth at the disposal of women as compared to men (e.g. Badunenko et al., 2010; Metzger & Young, 2020). Moreover, education (Metzger & Young, 2020) and relationship status have been put forward as determining factors concerning risk preferences, albeit with a controversial influence of relationship status (e.g. Bertocchi et al., 2011; Nutz, 2022). Therefore, based on the literature review conducted in this chapter, we arrive at the following hypotheses: (i) Differences in investment behaviour are mainly driven by wealth and income. (ii) However, even after controlling for income, there are still gender differences in investment behaviour with many studies pointing to a greater risk-aversion among females.

3. Data Description and Methodology

This section first provides a more detailed reasoning regarding the choice of dataset and a description of the data found in the HFCS. In the second step, this paper's methodology is introduced. Since it resembles the empirical approach taken by Schneebaum et al. (2018), we will outline their work in more detail.

3.1 Data Description

While much research on the topic of gendered investment behaviour is based on either the HFCS or the German SOEP dataset, this paper will mainly be using the HFCS. The SOEP survey-data is based on individual data collection (as opposed to household-level data collection for the HFCS) and thus would entail the advantage of a greater set of observations for our analysis. A disadvantage of the SOEP however, and the main reason why this paper will

be based on the HFCS instead, is the lack of detailed subdivision of financial assets. Since we focus specifically on the differences in investment behaviour between women and men, the data on specific financial assets and thus the detailed investment decisions of the reference household are indispensable for our analysis. Therefore, this paper will be using the 2017 HFCS dataset on German households.

The HFCS is a survey-based data collection that is being repeated every few years, the latest in 2010, 2014, 2017, and 2020. The 2017 dataset comprises 91,243 observations from households in 15 EU member countries. Although personal characteristics such as age, gender, and employment status are recorded for each household member, information on wealth variables such as inheritances, ownership of real estate, and investment in financial products is recorded at the household level only. This creates the difficulty of clearly assigning financial decision-making to the individual and accounting for their respective gender. Concerning, for instance, married couples, it is unclear which partner was the driving force behind certain investment decisions and which share of the joint wealth will be attributed to the individual partners in case of a separation. We will, hence, exclusively be using the data for single households, as therein the reference person is in total control over the household's finances and their gender can be established. When reducing the 2017 HFCS data on Germany to single households, our empirical analysis covers a sample of 1,342 observations.

One final issue resulting from the HFCS data collection process should be pointed out here. Although the households that receive information on the HFCS and are asked to participate in the survey are chosen based in random sampling, the ultimate HFCS dataset struggles with a self-selection bias as not all households are equally likely to respond to this request. For instance, households in certain regions may be more difficult to contact regularly than those in other regions. Similar issues apply to household wealth categories. Particularly the top wealth-owning households are less likely to respond to survey requests as they may be more difficult to contact due to security measures or are more reluctant to disclose personal information on their financial status. Importantly for our analysis, household wealth categories are also skewed along personal characteristics such as age, relationship status, or gender. Hence, it is questionable whether the households contained in the dataset analysed are truly representative of the population at large (Österreichische Nationalbank, 2022; Pérez-Duarte et al., 2011). These issues and their concomitant limitations regarding the conclusions drawn from the data need to be acknowledged when working with the HFCS.

3.2 Methodology

Given the heterogeneity in the literature on gender differences in investment behaviour thus far, establishing a clear line of research and argumentation will be vital to a more concise and meaningful discussion of the issue. We hope to contribute to this by following the methodology of Schneebaum et al. (2018), as it is among the most recent contributions to the literature. Moreover, Schneebaum et al. (2018) also analyse most factors potentially determining investment behaviour as reviewed in Section 2, making a replication of their methodology particularly meaningful for our research. The authors used the HFCS 2010 wave to point to possible gender differences in wealth accumulation in eight European countries, Germany among them. Besides its relevance to our research question, following the methodology of Schneebaum et al. (2018) with the updated 2017 dataset provides additional benefits. It allows for first grounds for comparison and possibly first indications as to how investment behaviour and gender differences therein change over time. While the analysis of these changes is beyond the scope of this paper, we hope to provide the basis for such research in the future to glean more precise information about gendered investment differences under various macroeconomic conditions. The following subsections provide more detail on the dependent and independent variables entailed in the OLS regression on our dataset of single households in Germany, in 2017.

3.2.1 The Dependent Variables

Based on Schneebaum et al. (2018), the availability of data in the HFCS 2017, and to answer our research question, we first regress *net wealth* (the sum of a household's real and financial assets at market prices, reduced by the total liabilities (both collateralised and unsecured debt)) on the independent variables outlined below. This regression is also performed by Schneebaum et al. (2018) and allows for an initial comparison between the 2010 and 2017 HFCS waves, possibly hinting at changes in investment behaviour over time. As this, however, is not the primary intent of our research, we extend the analysis of Schneebaum et al. (2018) by investigating the different components of net wealth and arranging them according to their perceived level of riskiness.

Thereby, the further dependent variables represent the different asset classes that households invest in. The HFCS 2017 provides data on both *real assets* and *financial assets*. The HFCS data on real assets comprises “real estate wealth”, “business wealth”, “vehicles”, and

“valuables”. The chosen dependent variable in the *real asset* category that will be included in our empirical analysis is “real estate properties” other than the main residence. Since our goal is to evaluate the investment behaviour of women and men regarding different investment options, we exclude other real asset categories. For instance, “vehicles” have a high depreciation rate wherefore they are not investments, besides very rare instances that we deemed neglectable. Similarly, “valuables” - consisting of jewellery, art works, and antiques - have an unpredictable path of worth development.

The dependent variables in the *financial asset* category are divided into “deposits” (both sight accounts and saving accounts), “mutual funds”, “bonds”, “non-self-employed private business”, “shares” (publicly traded, domestic, and foreign), “managed accounts”, “money owed to households”, “other assets”, and “voluntary pensions/whole life insurance”. As business ownership is already included in the regression as an independent variable, it is not meaningful to regress “non-self-employed private business” on the model introduced subsequently. In addition, “other assets” include such a broad spectrum of investments (oil and gas leases, precious metals, future proceeds from a lawsuit, etc.) that its riskiness can hardly be estimated. In comparison to contract-regulated options, “money owed to household” might capture money lent without an intention to generate profits like between friends or family members.

Thus, our empirical analysis will only cover financial assets, *deposits, mutual funds, bonds and shares, managed accounts, and voluntary pensions/whole life insurance.*

As aforementioned, we rank these different wealth components according to their degree of riskiness to detect whether gender plays a decisive role in the allocation of a portfolio. In doing so, we refer to the categorisation made by Chang (2010, chapter 5) and Barasinska and Schäfer (2013) who have already investigated female investment behaviour regarding different asset classes as outlined in the previous section. The former defines risky assets as ‘stocks’, ‘real estate investments’, and ‘business assets’, while the latter defines risky assets as ‘directly held stocks’ only.

Deposits can clearly be defined as a non-risky asset. Indeed, they are the most liquid form of financial investment and can be converted into cash anytime without significant losses.

The HFCS data on *pensions/whole life insurance* comprises public and occupational pensions, as well as additional voluntary pensions and life insurance plans. Public and occupational pensions can be regarded as very low-risk assets. The same can be said for voluntary and whole

life insurances. Although the latter two include somewhat more risk since they are not mediated by the state, they still represent binding agreements with the respective insurance provider. Moreover, given that only whole life insurances are included in this variable, the respective investor does not face the risk of paying for an insurance scheme that will never be disbursed, thereby making this a relatively safe investment.

In a similar vein, *managed accounts* would be deemed relatively risk-free, but will be neglectable in the empirical analysis conducted in this paper, since the number of households holding parts of their wealth in managed accounts is very low¹. As stated above, we follow Barasinska and Schäfer (2013) in their definition of risky assets as directly held stocks. In contrast, *managed accounts* are overseen by a professional money manager to whom the investor outsources the decision-making process. An account manager is a trained professional and per occupation dedicates the majority of their time to gathering information on the financial market and profitable investment opportunities. Hence, managed accounts are generally perceived to be less risky than those overseen by untrained individuals.

Bonds can be directly held by an individual investor and are therefore, according to Barasinska and Schäfer (2013), risky assets. Indeed, an investment in bonds provides lower liquidity than assets held in a deposit account. However, it is important to distinguish between corporate and government bonds, particularly when assessing their respective risks of insolvency. While the risk can be deemed substantial with regard to corporate bonds, government bonds can be regarded as relatively risk-free in this vein. Further, bonds constitute a fixed income instrument as they generally include an agreement on fixed interest payments made by the issuer of the bond. Thereby, bonds, if held until the end of their maturity, allow for more predictability than do shares or mutual funds. Unfortunately, a differentiation between corporate and government bonds is not possible by means of our regression analysis as the HFCS does not provide sufficient data on specific types of bonds. Hence, we categorise bonds as a relatively low-risk asset, with the caveats outlined above in mind.

Investment in real estate is generally regarded as a relatively safe investment decision. However, this must be qualified when considering that the dependent variable in this instance only includes real estate other than the household's main residence. Such investment in further real estate does not necessarily provide the benefit of a secure home in times of financial trouble. Nonetheless, it is accompanied by many of the responsibilities of home ownership such as

¹ In the examined data set (Section 4) of all single households in Germany whose reference person is aged between 25 and 60, none own wealth in the form of managed accounts.

renovation and maintenance which can be extremely costly. Moreover, a great deal of initial capital is needed to purchase real estate, often causing the investor to take on debt, thereby increasing the personal stake in the investment. Therefore, following Chang (2010, chapter 5), this paper classifies *other real estate* as a risky asset.

Mutual funds are not held and managed by the individual investor directly, hence their initial classification as non-risky assets by Barasinksa and Schäfer (2013). However, the authors retract this classification with regard to mutual funds in a later stage of their paper. Barasinksa and Schäfer (2013) acknowledge the widespread indirect ownership of stocks through mutual funds. Most importantly, they highlight that particularly women often prefer holding stocks indirectly and, hence, tend to resort to mutual funds. Hence, the authors postulate that not including mutual funds in the category of risky assets may result in underestimating the overall riskiness of an individual's portfolio. Therefore, we classify *mutual funds* as a risky asset in this paper.

Finally, *shares* are also categorised as 'risky assets' as they are generally directly held by the investor. Moreover, Chang (2010, chapter 5) emphasises the unpredictability of the stock market which may allow the investor to make a fortune but equally endangers them with losing their livelihood.

3.2.2 The Independent Variables

The dependent variables introduced in the previous subsection are regressed on the following OLS regression equation.

$$\text{Asset class} = \beta_0 + \beta_1 \text{Female} + \beta_2 \text{IMR} + \beta_3 X + \beta_4 \text{LargeInheritance} + \beta_5 \text{SmallInheritance} + \beta_6 E + \beta_7 \text{BusinessAssets} + \beta_8 \text{HomeOwnership} + \beta_9 \text{CollateralisedDebt} + \beta_{10} \text{UnsecuredDebt} + u$$

The variable X represents a vector of socio-economic variables such as age, number of children present in the household, and relationship status. Similarly, vector E comprises variables describing the reference person's employment status as detailed below.

The first coefficient represents the impact of our *gender* variable. This is a dummy variable that is equal to one if the reference person is female and equal to zero otherwise. The second coefficient represents the effect of the *Inverse Mills Ratio* (IMR) which is included to account for the self-selection into single households following Schneebaum et al. (2018). The authors argue that the selection of men and women into single households and the concomitant wealth of these households is affected by five issues: life expectancy, the tendency to marry at a young age, preferences regarding relationship status, career orientation, and social norms and customs

(Schneebaum et al., 2018). These selection issues need to be accounted for when working with single households only. This is done by restricting the sample to the working age population (25 to 60) and by applying a Heckman selection model which allows to calculate the IMR (see Schneebaum et al., 2018, p. 297). It should be pointed out that, once the sample is restricted to the reference person of working age, it only includes 676 observations to which we apply the regression above. Further, note here that the motivation for including the IMR in the regression equation differs from that for using survey weights provided by the HFCS dataset. While survey weights account for item non-response and the issue of self-selection in terms of participation in the HFCS survey, the IMR accounts for the issue of self-selection into single households. Thereby, including the IMR in the analysis allows for added preciseness of the estimation results as opposed to only working with survey weights. For more details on the use of survey weights and the paper's limitations in this vein, please see Section 5.2.

We then include vector X which provides information on the household's social circumstances. Firstly, this vector includes *age categories* with individuals aged 35 to 44 being the base category. Young age is on average correlated with lower income and wealth levels and a less established position in the labour market. Since those variables are accounted for, the influence of age on investment is less obvious. In the existing literature, age is usually inversely related to risk attitudes (Dohmen et al., 2011) and presence of risky assets (Barasinska & Schäfer, 2013). While younger persons might be more willing to engage in risky investments due to their remaining life-cycle income, people might be more focused on secure investments as they approach retirement.

Vector X further comprises dummies for the *education level* of the reference person with the base category "lower secondary education". Depending on the education level, we would expect varying effects on the different asset classes, mostly related to the financial literacy argument stemming from the literature review. With only a "primary education or lower", we would expect relatively little savings overall. Thus the household would arguably not have much wealth in any of the investment vehicles. Particularly for the risky assets, such as mutual funds and shares, "primary education or lower" is expected to have a negative effect. This is because a certain level of financial literacy is indispensable for a successful investment return on those assets. Further, in line with Bollen and Posavac (2018) or Barber and Odean (2001), arguably individuals with a lower education level have less confidence in their financial abilities. "Upper secondary education" is expected to have a positive effect only on deposits, as again the amount of savings is arguably limited, such that households would invest what they have in low-risk assets. Respectively, we expect this variable to have negative effects on riskier assets or those

that require a certain amount of seed capital. Finally, “tertiary education” arguably means that individuals have a relatively high income, and a possibly high level of financial literacy, and confidence. Thus, we expect this variable to positively affect riskier assets, like shares and mutual funds, and those which require a relatively high income, namely deposits and pensions/whole life insurance.

We then account for the *number of children* present (expressed as dummies denoting one, two, and three or more children) as well as the reference person’s *relationship status* (dummy variables on single, divorced, and widowed). The base categories are no children and married respectively.

Regarding the *number of children*, we expect this coefficient to correlate negatively with the amount of wealth owned overall, but also with the individual asset categories since children generally decrease financial resources for the parents. Further, we expect this negative effect to be the strongest for having the first child, since one could argue that there is a decreasing marginal financial burden effect of having children (Vanderkam, 2011). Moreover, as has been discussed in Section 2, the *relationship status* can have ambiguous effects. Scholars find marriage for example to potentially be either a safe asset or a financial risk, especially for women. With these varying arguments in mind, we cannot make any predictions regarding the relationship status to have a distinctive effect on any of the variables. Both the issue of children and the relationship status will be further discussed in Section 5.

Moreover, the model considers *inheritances* as an integral determinant of a household’s wealth. Following Schneebaum et al. (2018), we assume real value retention of each inheritance which is computed using the consumer price index (CPI) of the AMECO database (European Commission, 2023, for a more detailed description of the methodology, compare Schneebaum et al., 2018). We employ the median level of wealth in Germany for the 2017 HFCS dataset (172,000 EUR) as a cut-off to distinguish between large and small inheritances and maintain households that received no inheritance as the base category. Overall, inheritances should enable the household to invest in different asset classes. In particular as the determinant of risky investments, a household’s financial means is the core variable according to the reviewed literature. Hence, large inheritances should be a decisive variable.

Vector E accounts for the reference person’s participation in the labour market as described by dummy variables and can be used to capture the individual’s security of income. Each household is assigned an *employment status*, namely employee with permanent contract (base category), employee with temporary contract, self-employed, employer, unemployed, out of

labour force, or retired. In terms of security of income flows, temporary contracts, for instance, should undermine risky investments due to a less secure income flow than those permanently employed enjoy. In a similar vein, we expect the unemployed to invest less in risky assets than in secure ones. Other employment categories are less conclusive. Being self-employed or an employer includes a variety of professions with deviating performance pressures, profit margins, dependence on seasonality, and overall economic situation. The business success of self-employed lawyers is arguably more secure than that of self-employed artists. The vector E further includes the *work age ratio*, meaning the share of the reference person's potential working life (since the age of 16) that was spent working. A large ratio implies an established position in the labour market but is also inversely correlated with time spent in higher education. Finally, the vector includes a variable describing the amount of *weekly working hours*. The predicted effect on this variable is somewhat unclear. On the one hand, less-wealthy households might be forced to work more than richer ones, indicating a negative relation with financial assets. On the other hand, more hours worked should be associated with more income and therefore positively related to investment. Despite the ambiguity of this variable, it will be included in the regression analysis to allow for the most precise comparability of our results with those of Schneebaum et al. (2018).

Lastly, several of possible wealth determinants are incorporated into the regression model: Ownership of *business assets* (in the form of publicly traded or non-traded business assets, with or without self-employment), *owner-occupied housing*, *collateralised debt* (i.e. mortgages), and *unsecured debt* (credit card debt, overdrafts, and other unsecured debt) are included in our analysis as dummy variables. First of all, business assets contribute to the household's wealth and, therefore, should encourage overall investment, including risky ones. Home-ownership should be positively related to all investments because it substantially increases disposable income. Even if the household is still financing its home, commercial lending is subject to a selection process favouring individuals with reliable finances. Concerning both liability types, since debt weighs both on a household's available/investable resources (savings) and on the readiness for risky investment behaviour, we expect these two independent variables to have a negative effect on all asset categories. Especially however again on the riskiest assets, shares, and mutual funds, and those that require a certain amount of seed capital, namely other real estate and (to a lesser extent) deposits.

The next section will present the results of our OLS regression based on the methodology introduced above and discuss the extent to which they allow for the conclusion that investment behaviour differs along gender.

4. Empirical Analysis of Investment Behaviour and Gender in Germany

In the following section, the empirical results will be shown and will then be discussed subsequently in Section 5.

Table 1 shows the results for the OLS estimates of the net wealth of single households in Germany in 2017. As in Schneebaum et al. (2018), gender has no significant effect on the net wealth of single households. However, even if not significantly, being a female-led single household would impact the household's net wealth positively, whereas Schneebaum et al. (2018) find a negative effect here. Further, being in the age group 25 to 34, as well as having a small inheritance, being unemployed, being out of the labour force, being retired, or owning unsecured debt, each has a significant negative impact on the level of net wealth owned.

The following variables have a significant positive effect on the net wealth of a household – both upper secondary and tertiary education, as well as owning business assets, and being a homeowner. To note, neither children (any number) nor the relationship status has a significant effect on the net wealth variable, which will be further analysed in Section 5.

Table 1: Net Wealth of Single Households, Germany 2017

	<i>Dependent variable:</i>
	Net Wealth
Female	0.096 (0.554)
IMR	-0.757 (1.719)
Age 25-34	-1.513** (0.727)
Age 45-60	-0.582 (0.622)
Primary education or lower	0.766 (1.801)
Upper secondary education	2.314* (1.249)
Tertiary education	3.337*** (1.274)
One Child	0.483 (0.769)
Two Children	0.515 (1.068)
Three+ Children	1.664 (1.870)
Single	-1.981 (2.305)
Divorced	-2.172 (2.391)
Widowed	-2.019 (2.310)
Large Inheritance	0.895 (1.496)
Small Inheritance	-1.055* (0.595)
Temporary Employment	-1.257 (0.782)
Employer	0.333 (1.649)
Self Employed	0.002 (1.040)
Unemployed	-4.226*** (1.098)
Out of Labour Force	-3.003*** (1.119)
Retired	-3.424* (2.052)
Work Age Ratio	-0.215 (1.016)
Hours Working per Week	0.020 (0.018)
Business Assets	1.513* (0.869)
Home Ownership	3.905*** (0.877)
Collateralised Debt	0.407 (0.675)
Unsecured Debt	-6.051*** (0.465)
Constant	10.230*** (3.391)

Note:

*p<0.1; **p<0.05; ***p<0.0

Source: HFCS 2017, Own representation.

This table shows the results from an OLS regression of net wealth on the listed explanatory variables for 767 single households in Germany, 2017. The main independent variable of interest, female, is a binary variable, equal to 1 if the household head is a woman and 0 otherwise. All variables representing a monetary value have been subjected to an inverse hyperbolic sine transformation. IMR represents the Inverse Mills Ratio accounting for self-selection into single households and has been obtained from a Heckman selection model. For further information please consult with the authors.

Now, to answer our research question, namely which factors determine female and male investment behaviour in Germany regarding different asset classes, as described in the methodology, this paper conducts OLS regressions on specific financial and real assets, such as to determine the relevant and impactful factors. Table 2 shows the corresponding results for real estate, shares, and mutual funds. First and foremost, our empirical results show the significance of the gender variable in those assets which have been categorised as risky assets, namely *shares* and *mutual funds*. Therein, the household's reference person being female rather than male, has a significant negative effect on the amount of wealth owned in shares and mutual funds.

To further analyse these two risky dependent variables, where gender has a significant effect, it is interesting to see how the significance of being female changes when controlling for *gross household income*. When including income as an independent variable in the regression, being female continues to have a significant negative effect on shares and mutual funds but to a lesser extent. The gross household income variable is highly (positively) significant for shares while it is insignificant with regard to mutual funds (Table 3). Thus, one could argue that the significance of the female variable for the amount of wealth held in shares and mutual funds is to a certain extent because women often have a lower income than men. After including income, this is then reflected in the lower significance of the female variable. Hence, overall, this indicates that being female is not per se the main/only factor in women's investment behaviour (less wealth held in risky assets). Instead, a relevant factor here is that women invest in less risky assets, because they have a smaller income cushion to fall back on. This is in line with previous research (e.g. Badunenko et al., 2010) and supports our first hypothesis, that differences in investment behaviour are mainly driven by wealth and income.

Further, for those assets, which have been categorised as "less or not risky", the gender variable is insignificant. Being female has no significant effect on "other real estate", "deposits", "bonds", or "pensions/whole life insurance". However, while the latter three are insignificantly positively affected by gender, "other real estate" is so negatively as shown in Table 4.

Table 2: Real Estate, Shares and Mutual Funds of Single Households, Germany, 2017

	<i>Dependent variable:</i>		
	Other Real Estate (1)	Shares (2)	Mutual Funds (3)
Female	-0.056 (0.430)	-0.643** (0.309)	-0.719* (0.370)
IMR	0.403 (1.336)	0.223 (0.960)	-0.686 (1.148)
Age 25-34	-0.486 (0.565)	-0.058 (0.406)	-0.357 (0.485)
Age 45-60	1.263*** (0.483)	0.578* (0.348)	0.394 (0.415)
Primary education or lower	0.945 (1.400)	-0.017 (1.007)	-0.540 (1.203)
Upper secondary education	0.939 (0.971)	-0.077 (0.698)	-0.151 (0.834)
Tertiary education	1.511 (0.990)	1.218* (0.712)	1.944** (0.851)
One Child	-0.328 (0.597)	-0.188 (0.430)	0.293 (0.513)
Two Children	-1.196 (0.830)	0.053 (0.597)	-0.275 (0.713)
Three+ Children	1.870 (1.453)	0.667 (1.045)	1.644 (1.249)
Single	0.198 (1.791)	0.427 (1.288)	0.031 (1.539)
Divorced	-0.154 (1.858)	-0.018 (1.336)	-0.677 (1.597)
Widowed	0.723 (1.795)	0.117 (1.291)	-0.983 (1.542)
Large Inheritance	6.250*** (1.162)	1.045 (0.836)	1.445 (0.999)
Small Inheritance	0.595 (0.462)	0.266 (0.333)	-0.014 (0.397)
Temporary Employment	-0.530 (0.608)	-0.772* (0.437)	-1.391*** (0.522)
Employer	0.989 (1.282)	-0.240 (0.922)	-0.975 (1.101)
Self Employed	-0.206 (0.808)	-0.509 (0.581)	-1.187* (0.694)
Unemployed	-0.625 (0.853)	-0.628 (0.613)	0.109 (0.733)
Out of Labour Force	-1.163 (0.869)	-1.152* (0.625)	-0.375 (0.747)
Retired	-1.287 (1.594)	-0.761 (1.146)	0.782 (1.370)
Work Age Ratio	-0.213 (0.789)	-0.600 (0.568)	0.809 (0.678)
Hours Working per Week	-0.004 (0.014)	0.002 (0.010)	0.024** (0.012)
Business Assets	1.466** (0.675)	0.700 (0.486)	1.029* (0.580)
Home Ownership	0.472 (0.682)	0.579 (0.490)	0.721 (0.586)
Collateralised Debt	3.141*** (0.525)	0.293 (0.377)	-0.530 (0.451)
Unsecured Debt	-0.126 (0.361)	-0.877*** (0.260)	-0.769** (0.310)
Constant	-0.288 (2.635)	0.900 (1.895)	0.864 (2.264)

Note:

*p<0.1; **p<0.05; ***p<0.01

Source: HFCS 2017, Own representation.

This table shows the results from an OLS regression for 767 single households in Germany, 2017. The dependent variables are the value of the household's other real estate in column (1), shares in column (2), and mutual funds in column (3) in 2017 Euros. The main independent variable of interest, female, is a binary variable, equal to 1 if the household head is a woman and 0 otherwise. All variables representing a monetary value have been subjected to an inverse hyperbolic sine transformation. IMR represents the Inverse Mills Ratio accounting for self-selection into single households and has been obtained from a Heckman selection model. For further information please consult with the authors.

Table 3: Shares and Mutual Funds of Single Households when Controlling for Income, Germany, 2017

	<i>Dependent variable:</i>	
	Shares (1)	Mutual Funds (2)
Female	-0.614 ^{**} (0.307)	-0.711 [*] (0.370)
IMR	0.382 (0.954)	-0.642 (1.149)
Gross Household Income	0.326 ^{***} (0.096)	0.089 (0.116)
Age 25-34	0.029 (0.404)	-0.333 (0.486)
Age 45-60	0.617 [*] (0.345)	0.405 (0.416)
Primary education or lower	0.218 (1.001)	-0.475 (1.206)
Upper secondary education	-0.102 (0.693)	-0.157 (0.834)
Tertiary education	1.076 (0.708)	1.905 ^{**} (0.852)
Large Inheritance	0.831 (0.831)	1.387 (1.002)
Small Inheritance	0.325 (0.330)	0.002 (0.398)
Temporary Employment	-0.623 (0.436)	-1.350 ^{**} (0.525)
Employer	0.026 (0.918)	-0.902 (1.106)
Self Employed	-0.324 (0.579)	-1.136 (0.698)
Unemployed	-0.569 (0.609)	0.126 (0.733)
Out of Labour Force	-0.880 (0.625)	-0.300 (0.753)
Retired	-0.842 (1.138)	0.760 (1.370)
Work Age Ratio	-0.693 (0.564)	0.783 (0.679)
Hours Working per Week	-0.005 (0.010)	0.022 [*] (0.013)
Business Assets	0.542 (0.484)	0.985 [*] (0.583)
Home Ownership	0.555 (0.486)	0.714 (0.586)
Collateralised Debt	0.192 (0.375)	-0.557 (0.452)
Unsecured Debt	-0.846 ^{***} (0.258)	-0.760 ^{**} (0.311)
Constant	-2.646 (2.151)	-0.110 (2.592)

Note:

*p<0.1; **p<0.05; ***p<0.01

Source: HFCS 2017, Own representation.

This table shows the results from an OLS regression for 767 single households in Germany, 2017. The dependent variables are the value of the household's shared in column (1) and mutual funds in column (2) in 2017 Euros. The household's gross annual income has been included in this regression as compared to table 2. The main independent variable of interest, female, is a binary variable, equal to 1 if the household head is a woman and 0 otherwise. All variables representing a monetary value have been subjected to an inverse hyperbolic sine transformation. IMR represents the Inverse Mills Ratio accounting for self-selection into single households and has been obtained from a Heckman selection model. For further information please consult with the authors.

Please note that for reasons of representation, some explanatory variables are included in the regression but not reported in the table. These are: Dummy variables denoting whether the household has one, two, or three or more children as well as three dummy variables which take a value of one if the household is single, divorced, or widowed.

Table 4: Deposits, Bonds and Pensions/Whole Life Insurances of Single Households, Germany, 2017

	<i>Dependent variable:</i>		
	Deposits (1)	Bonds (2)	Pension/Whole Life Insurance (3)
Female	0.308 (0.275)	0.009 (0.167)	0.436 (0.480)
IMR	0.530 (0.855)	0.288 (0.518)	-1.633 (1.492)
Age 25-34	0.016 (0.362)	-0.334 (0.219)	-0.957 (0.631)
Age 45-60	0.212 (0.309)	-0.299 (0.188)	0.392 (0.540)
Primary education or lower	0.711 (0.896)	0.385 (0.543)	1.345 (1.563)
Upper secondary education	2.164*** (0.622)	-0.164 (0.377)	1.413 (1.084)
Tertiary education	3.536*** (0.634)	0.183 (0.384)	2.439** (1.106)
One Child	-0.366 (0.383)	-0.296 (0.232)	0.544 (0.667)
Two Children	-0.315 (0.531)	-0.421 (0.322)	-0.205 (0.927)
Three+ Children	-0.846 (0.931)	-0.178 (0.564)	2.813* (1.623)
Single	0.805 (1.147)	0.194 (0.695)	-1.283 (2.000)
Divorced	0.477 (1.190)	0.330 (0.721)	-2.402 (2.075)
Widowed	0.467 (1.149)	-0.053 (0.697)	-1.911 (2.004)
Large Inheritance	1.329* (0.744)	1.066** (0.451)	-1.495 (1.298)
Small Inheritance	-0.099 (0.296)	0.117 (0.180)	-0.156 (0.517)
Temporary Employment	-0.263 (0.389)	0.335 (0.236)	-2.927*** (0.679)
Employer	-1.389* (0.821)	-0.971* (0.497)	-2.963** (1.431)
Self Employed	-0.719 (0.517)	-0.557* (0.314)	-1.660* (0.903)
Unemployed	-1.544*** (0.546)	0.229 (0.331)	-0.957 (0.952)
Out of Labour Force	-1.187** (0.557)	0.148 (0.338)	-1.730* (0.971)
Retired	-0.530 (1.021)	-0.017 (0.619)	-0.855 (1.780)
Work Age Ratio	-0.497 (0.505)	0.224 (0.306)	0.490 (0.881)
Hours Working per Week	0.027*** (0.009)	0.009* (0.006)	0.058*** (0.016)
Business Assets	1.216*** (0.432)	0.576** (0.262)	1.576** (0.754)
Home Ownership	1.225*** (0.436)	0.078 (0.265)	1.503** (0.761)
Collateralised Debt	0.256 (0.336)	-0.035 (0.204)	0.225 (0.586)
Unsecured Debt	-1.687*** (0.231)	-0.207 (0.140)	-0.246 (0.404)
Constant	4.422*** (1.687)	-0.332 (1.023)	3.569 (2.943)

Note:

*p<0.1; **p<0.05; ***p<0.01

Source: HFCS 2017, Own representation.

This table shows the results from an OLS regression for 767 single households in Germany, 2017. The dependent variables are the value of the household's deposits in column (1), bonds in column (2), and pensions/whole life insurances in column (3) in 2017 Euros. The main independent variable of interest, female, is a binary variable, equal to 1 if the household head is a woman and 0 otherwise. All variables representing a monetary value have been subjected to an inverse hyperbolic sine transformation. IMR represents the Inverse Mills Ratio accounting for self-selection into single households and has been obtained from a Heckman selection model. For further information please consult with the authors.

Being aged 45 to 60 has a strongly significant positive effect on owning other real estate assets and to a lesser extent owning shares. Having an upper secondary education only significantly positively impacts owning deposits, while having a tertiary education has a significant positive effect on mutual funds, deposits, pensions/whole life insurance, and to a lesser degree, shares. Having children is surprisingly insignificant in most cases, except for owning pensions/whole life insurance where it has a slightly significant positive effect. The impact of children will be further analysed subsequently. Having a large inheritance significantly affects owning other real estate and bonds positively, and to a lesser extent deposits.

Working on a temporary contract most strongly negatively affects mutual funds and pensions/whole life insurance and less so shares, while being an employer negatively affects the amount of wealth owned in the form of pensions/whole life insurance and less significantly so, owning deposits and bonds. Further, being self-employed slightly significantly decreases the amount of wealth owned in mutual funds and bonds and pensions/whole life insurance. Being unemployed has a significant negative effect on owning deposits, whereas being out of the labour force has slightly significant negative effects on shares, deposits, and again, pensions/whole life insurance. The number of hours worked per week positively affects owning mutual funds, as well as deposits and pensions/whole life insurance significantly.

Owning business assets has a significant positive effect most strongly on deposits, as well as owning other real estate, bonds, pensions/whole life insurance, and less so mutual funds while owning a home has a significant positive impact on deposits and pensions/whole life insurance. Finally, regarding liabilities, owning collateralised debt has a slightly significant positive effect on owning other real estate properties, whereas unsecured debt significantly decreases deposits, shares, and mutual funds.

All other independent variables that have not been mentioned do not portray a significant effect on either of the asset types and thus will not be further treated. How these results can be interpreted/analysed further, will be discussed in the following.

To sum up the results of our empirical analysis with regard to our research question, we find that they provide tentative confirmations for both our hypotheses. Although indicators of a household's financial wealth, such as inheritances, home ownership, and accumulated debt were often significant factors in investment decisions, so was the gender variable when analysing risky assets. Females do appear to be significantly less inclined to invest in risky

assets than their male counterparts. This statement holds even when further controlling for gross household income.

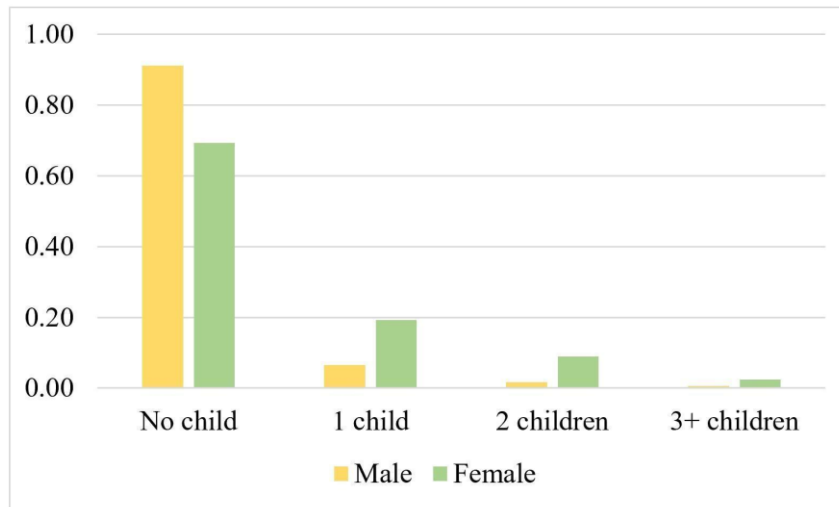
5. Discussion

Despite the affirming results presented above, the quantitative analysis also entailed certain surprises, particularly regarding the significance of children and relationship status, which will be discussed in the following and call upon further research. These unexpected findings may also be due to the limitations of the research conducted in this paper which will be acknowledged subsequently.

5.1 Unexpected Findings and Indications for Further Research

As mentioned in Section 3.2.2, we had expected the *number of children* to have a significant negative effect on the amount of wealth owned, as well as on the different asset classes. Further, we hypothesised that having one child would have a stronger effect than having multiple children since having children follows a decreasing marginal financial cost structure (Vanderkam, 2011). However, as has been shown in Section 4, the number of children does not significantly affect either the wealth variable or any of the asset variables, except for pensions/whole life insurance. The latter is slightly significantly positively affected by having at least three children. This is particularly surprising because for investing in pensions/whole life insurance, a relatively elevated amount of income and wealth is required. However, Schneebaum et al. (2018) assert that children are negatively correlated with the wealth of single households and have been found to have a negative effect on the accumulation of wealth. At the same time, those women who live in single households are more likely to have children than men in single households. According to Schneebaum et al. (2018), in Germany in 2010, 75.8% of female-led single households had no children, while 97.2% of male-led ones had none. This unequal distribution pattern is consistent in different numbers of children present, for example, 2.1% of female-led single households had three or more children, while none of the male-led single households had this number of children. Thus, especially for women but generally for all single households, the significant positive effect of three or more children on pensions/whole life insurance is contrary to expectations. This unequal distribution pattern occurs also in our empirical analysis, as shown in Figure 1.

Figure 1: Distribution of Number of Children – Single Households, Germany, 2017



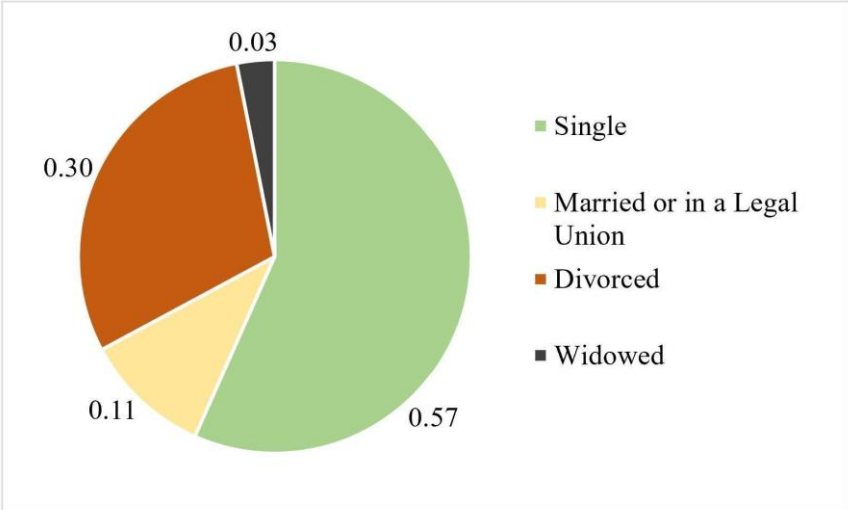
Source: HFCS 2017, Own representation.

However, further aspects could explain this positive effect. For one, Germany has a specific pension scheme for parents. Since 2014, the so-called “Mütterrente” (“mothers’ pension”) has awarded pension points to people with children. For each child that was born before 1992, the parent received two additional pension points (in 2017, before this system was reformed in 2019, such that each child brings in 2.5 pension points) (Bundesministerium Arbeit und Soziales, 2019). The gross value of each pension point per month in 2017 was on average 37.01 EUR (Deutsche Rentenversicherung, 2017). A parent with three children (who were born before 1992) in 2017 would thus receive around 5,330 EUR of additional pension or 7,106 EUR for four children. Since one child would only add around 1,700 EUR in additional pension wealth, this could be an explanatory factor for the significant positive effect of having three or more children on the wealth held in pensions/whole life insurance. Furthermore, in our sample data, only ten of the 676 single households with a reference person aged 25 to 60, had three or more children. With this small size of the data, the validity of the results is potentially questionable.

In Section 3.2.2, we elaborated on the ambiguous effects of the *relationship status* in previous literature. Aside from the ambiguity (marriage as a “safe asset” or a financial risk), most research has found the relationship status to have a significant effect on both the amount of net wealth held by individuals and the asset types wherein this wealth is held. Thus, we did not expect a specific direction of the effect, but we did predict this variable to have a significant effect on the dependent variables. However, contrary to our expectations, neither of the *relationship status* variables had a significant effect on any of the dependent variables, as in Schneebaum et al. (2018). Notably, Jianakoplos et al. (2003) for example assert that it is not

marital status per se, that influences the investment behaviour, but the differences in financial endowments between married and unmarried individuals. This argument resembles closely the one regarding income and differences in investment behaviour between genders. There, it is rather the low financial income cushion, which prevents females from investing in as many risky assets as males do. As mentioned, however, being married does not always signify greater financial resources but could also entail financial risk, i.e., when being tied to a financially less endowed person. How being single, married, divorced, or widowed will affect one’s investment behaviour remains uncertain. One feature of the examined dataset in this paper is relevant here. Since we only analyse single households, we argue that singles and divorcees are overrepresented. Namely, 57% and 30% are single and divorced respectively (Figure 2). Further, those who are married are arguably not a very representative sample of married people generally in Germany, as they live separately from their spouses and thus are probably outliers.

Figure 2: Share of Relationship Statuses in Total Households, Germany, 2017



Source: HFCS 2017, Own representation.

As discussed in Section 3.2.2, some variables describing the employment status are difficult to assess. In our regression, being an *employer*, i.e. being self-employed with employees, is mostly insignificant in the determination of investments into asset classes. For the relatively safe assets *deposits, bonds, and pensions/whole life insurance*, however, the coefficients are significant and negative. While it is worrisome, that employers do not invest in safe assets, in particular in pensions/whole life insurance, one has to keep in mind that the group of employers is highly heterogeneous with regards to the number of employees, business type and size, as well as business performance which might distort the informative value of this independent variable. Hence, a major determinant for investments - the occurrence of permanent and secure income

streams – is all but guaranteed for employers. Since we do not have variables directly capturing the business size of individuals registered as employers, *business assets* should be considered an adequate proxy for minor statistical exercises. In fact, the data set incorporates a weak (~ 0.12), but positive correlation between *business assets* and *pensions/whole life insurance*. Therefore, intuitively a larger business (and presumably a steadier income stream for the employer) is associated with higher investments into pensions/whole life insurance. Further research should investigate whether possible linkages between sizes of business operations and profitability might explain this positive relationship. In general, a more detailed analysis on the effect of the employment status with more advanced variables that better capture the heterogeneity of the current variables is necessary.

Also, the importance of unsecured debt is noteworthy. First of all, unsecured debt is the single most important explanatory variable in the determination of net wealth as a comparison with the magnitudes of the other significant variables - home ownership, unemployed, tertiary education, retired, and out of labour force - highlights. While unsecured debt is only statistically significant for deposits, shares, and mutual funds, it affects the investment in all asset classes negatively. The inverse relationship between unsecured debt and the investment in deposits is expected since deposits are most likely the means of repayment for the unsecured debt. Also, households owning substantial unsecured debt are less prepared to engage in further risky investment such as shares and mutual funds. Arguably, the investment in real estate poses a special case with regards to debt, since real estate is a type of secured debt. Banks additionally determine credit worthiness, thereby introducing a selection bias for the individuals that invest in real estate. The regression supports this line of argument insofar as real estate is the only asset class for which collateralized debt is a significant variable.

Having discussed the unexpected findings and indications for further research, we, additionally, replicated the regression by Schneebaum et al. (2018) with the 2010 data wave. As in our 2017 data regression and in contrast to Schneebaum et al. (2018), we only used one of the five imputations (further elaborated in Section 5.2). While this might skew the final output slightly, this also allows for a direct comparison between our 2017 and 2010 regression results. Moreover, we can rule out procedural error in the empirical analysis due to Schneebaum et al.'s (2018) limited explanations regarding the more technical aspects of their regression. Even though minor deviations between our and Schneebaum et al.'s (2018) regression results exist, all in all they compare well (see Appendix).

Interestingly, in contrast to the 2017 data set, owning bonds is inversely and real estate positively affected by *female* in the 2010 data set. Since the gender coefficient is not significant regarding bonds and real estate neither in 2010 nor 2017, we cannot statistically verify the gender effect. Nevertheless, the distinct macroeconomic circumstances in 2010 in the aftermath of the Financial Crisis and Great Recession, should be considered if further analysis is done regarding this aspect.

5.2 Limitations

Although we tentatively conclude that the results of our empirical analysis confirm our hypothesis that gender is a significant determinant of investment behaviour, they are subject to certain limitations that must be acknowledged here.

As outlined in Section 3, the HFCS does not come without its own caveats. For one, it is a survey-based dataset, meaning it suffers from a self-selection bias as certain households may be more or less likely to respond to the participation request. Besides factors such as age, or location of the household, wealth also plays a decisive role in this regard. As such, the top wealth owners tend to remain unresponsive to the HFCS survey and are, thus, underrepresented in the data (Waltl & Chakraborty, 2022). Hence, it is questionable whether the results presented in this paper also hold for the wealthiest percentiles.

Secondly, and possibly the most severe limitation when working with the HFCS, the data on income and wealth is reported at the household level only. For the purpose of this paper's research question which focused on individual differences in investment behaviour according to gender, this necessitated restricting the data to single households only. This restriction severely decreased the number of observations included in the empirical analysis to a total of 676 single households whose reference person was between 25 and 60 years of age. This must be accounted for when attempting to draw general conclusions from the results presented in this paper.

Restricting the dataset to such a drastic extent could have been avoided through using the SOEP dataset which reports at the individual level. However, as aforementioned, the data in the SOEP does not provide information on income and wealth levels as detailed as does the HFCS. Any researcher interested in gender and investment behaviour is, thus, faced with the trade-off between the HFCS and the SOEP which places limitations on the general validity of their results. Therefore, this paper urges the institutions in charge to pay more attention to collecting

and reporting gender-segregated data. This will be the first and most vital step towards conducting meaningful research from which generalisable results can be established.

Besides the limitations stemming from working with the HFCS as such, this paper faced certain obstacles in the replication of the regression model conducted by Schneebaum et al. (2018). To begin with, Schneebaum et al. (2018) utilise a Heckman selection model and the resulting IMR to account for the self-selection mechanism into single households in the overall regression. This paper has attempted to replicate this selection model and the computation of the IMR to the fullest extent possible. However, Schneebaum et al. (2018) do not provide the full specifications of the Heckman selection model. Hence, it must be assumed that the IMR employed by Schneebaum et al. (2018) and the IMR employed in this paper differ. This is also suggested by a comparison of the results as the coefficient of the IMR in the regression of Schneebaum et al. (2018) is markedly different than that of this paper. Nonetheless, as the results in this paper do account for the self-selection into single households, they can be assumed to be robust in this regard.

A more meaningful difference between this paper and that of Schneebaum et al. (2018), however, is the varying use of imputations and weights provided by the HFCS. The HFCS addresses item non-response by providing five different imputations for each missing value in order to take into account imputation uncertainty. Thereby, each dataset exists in a total of five complete but different versions. Moreover, the HFCS provides survey weights to compensate for the self-selection bias and the issue of unit non-response detailed above (European Central Bank, 2023).

Schneebaum et al. (2018) conduct their research with a dataset taking all five different imputations into account using Rubin's Rule and calculate their estimates using survey weights. Due to its limited scope, this paper only employs the imputation presumably closest to the mean of all five imputations. The HFCS User Guide suggests adding weights only once all five imputations have been taken into consideration. Moreover, it questions whether their use is reasonable in regression analyses (European Central Bank, 2023). Therefore, this paper refrains from adding survey weights.

These represent two significant differences between the dataset used by Schneebaum et al. (2018) and the data employed in this paper. Hence, they may serve to explain the deviations between the regression outcomes of their work and the work presented here. Nonetheless, we

believe that this paper points to an important direction, albeit a consideration of all five imputations will be required when assessing the results in more detail.

6. Outlook and Conclusion

This paper has set out to assess whether investment decisions, particularly with regards to risky financial and real assets, are influenced by and differ according to gender. In a first step, it has critically reviewed the existing literature on this matter and pointed out the ambiguous state of the research. While some argue that women are inherently less prone to taking financial risks (e.g. Chang, 2010, chapter 5; Barber & Odean, 2001), others emphasise socioeconomic factors that differ between men and women and, thus, result in different risk preferences between the two genders (e.g. Badunenko et al., 2010; Metzger & Young, 2020, Bertocchi et al., 2011). The latter emphasise determinants such as wealth accumulation, education, and relationship status in particular.

Based on this literature review, the methodology for our quantitative research was developed in Section 3 and its results presented in Section 4. With these results, this paper now returns to its research question: *Which factors determine female and male investment behaviour in Germany regarding different asset classes?* This paper argues that both of its hypotheses have been tentatively confirmed by the regression results. Indicators of household wealth such as debt, inheritances, and home ownership were significant determinants of investment decisions. When added as an independent variable, gross household income was also significant with regards to shares although no significant impact on mutual funds was detected. Nonetheless, even when controlling for income, the gender variable remained significant for those assets deemed most risky. This indicates that risk preferences are determined by factors other than wealth, income, education, or employment status which are most commonly highlighted by the literature.

However, this paper cautions to conclude that women are inherently less prone to taking risks than their male counterparts. This caution is appropriate, firstly, due to the paper's limitations pointed out in Section 5.2 when working with the HFCS data, particularly the low number of observations due to limiting the dataset to single households only. Once again, this paper urges the responsible institutions to pay closer attention to gender segregated data as this will be an absolute necessity for confirming the results found in our analysis. Secondly, not all factors hinted at in Section 2 could be considered in the regression model. For instance, the HFCS does not provide qualitative information on the household head's familiarity with the financial market or their level of confidence and optimism regarding investment decisions. Hence, this

paper can make no definitive conclusions as to whether the significance of the gender variable is attributed to an inherently female trait, or whether it is due to factors not controlled for in our model.

Moreover, and as outlined in Section 5.1, we were somewhat surprised by the overall insignificance of children and relationship status in our regression. Although the results are in line with those of Schneebaum et al. (2018), we, once again, attribute these unexpected findings partly to the restriction of the dataset to single households. Hence, further research using more encompassing data will be necessary to assess the impact of these factors in investment decisions and the role still played by gender once this is accounted for.

All in all, this paper hopes to draw attention to the unequal strategies of wealth accumulation between men and women and their ramifications for wealth distribution and poverty in old age as hinted at in the introduction. Exploring the precise impact of different investment behaviour between men and women on poverty in old age was beyond the scope of this paper. Nonetheless, it encourages future research to investigate these impacts more closely. Such investigations are all the more relevant given the reforms that will evidently have to be made in the current pension systems of most OECD countries. The results presented in this paper indicate that gender is an important, yet often neglected, factor when constructing pension systems. Therefore, it urges policymakers to take gender differences in investment behaviour into account when deciding on these very reforms that will, undoubtedly, impact the wellbeing of generations to come.

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Appendix

Table 5: Net Wealth of Single Households, Germany, 2010

	<i>Dependent variable:</i>
	Net Wealth
Female	0.458 (0.626)
IMR	0.443 (1.771)
Age 25-34	-0.037 (0.807)
Age 45-60	1.202 (0.752)
Primary education or lower	-0.569 (2.397)
Upper secondary education	2.852** (1.203)
Tertiary education	3.992*** (1.254)
One Child	0.244 (0.925)
Two Children	-0.609 (1.235)
Three+ Children	5.226** (2.291)
Single	3.014 (2.413)
Divorced	1.364 (2.256)
Widowed	0.868 (2.585)
Large Inheritance	2.614** (1.252)
Small Inheritance	2.052*** (0.691)
Temporary Employment	-1.963* (1.047)
Employer	2.144 (2.182)
Self Employed	0.223 (1.281)
Unemployed	-3.322** (1.366)
Out of Labour Force	-0.888 (1.386)
Retired	3.283 (2.989)
Work Age Ratio	1.129 (1.230)
Hours Working per Week	0.045 (0.028)
Business Assets	0.417 (1.339)
Home Ownership	4.094*** (1.218)
Collateralised Debt	-1.383 (0.962)
Unsecured Debt	-5.561*** (0.547)
Constant	0.757 (3.533)

Note:

*p<0.1; **p<0.05; ***p<0.01

Source: HFCS 2010, Own representation.

This table shows the results from an OLS regression of net wealth on the listed explanatory variables for 523 single households in Germany, 2010. The main independent variable of interest, female, is a binary variable, equal to 1 if the household head is a woman and 0 otherwise. All variables representing a monetary value have been subjected to an inverse hyperbolic sine transformation. IMR represents the Inverse Mills Ratio accounting for self-selection into single households and has been obtained from a Heckman selection model. For further information please consult with the authors.

Table 6: Real Estate, Shares and Mutual Funds of Single Households, Germany, 2010

	<i>Dependent variable:</i>		
	Other Real Estate (1)	Shares (2)	Mutual Funds (3)
Female	0.459 (0.353)	-0.763*** (0.288)	-0.556 (0.377)
IMR	0.827 (0.999)	0.509 (0.815)	2.593** (1.068)
Age 25-34	-0.285 (0.455)	-0.227 (0.371)	-0.253 (0.487)
Age 45-60	0.251 (0.424)	-0.014 (0.346)	0.036 (0.453)
Primary education or lower	0.720 (1.351)	-0.193 (1.102)	-0.053 (1.445)
Upper secondary education	0.575 (0.678)	0.185 (0.553)	0.833 (0.726)
Tertiary education	1.312* (0.707)	1.465** (0.577)	2.165*** (0.756)
One Child	0.344 (0.521)	-0.348 (0.425)	-0.585 (0.557)
Two Children	-0.982 (0.696)	0.221 (0.568)	0.748 (0.745)
Three+ Children	0.049 (1.292)	-0.201 (1.054)	1.850 (1.382)
Single	0.163 (1.361)	1.033 (1.110)	3.685** (1.455)
Divorced	-0.437 (1.272)	0.634 (1.037)	2.458* (1.360)
Widowed	0.287 (1.458)	0.340 (1.189)	2.357 (1.559)
Large Inheritance	6.350*** (0.706)	3.330*** (0.576)	4.024*** (0.755)
Small Inheritance	0.736* (0.389)	0.995*** (0.318)	0.550 (0.417)
Temporary Employment	0.001 (0.590)	-0.785 (0.481)	-0.782 (0.631)
Employer	0.473 (1.230)	-0.571 (1.003)	0.554 (1.316)
Self Employed	-0.899 (0.722)	-1.359** (0.589)	-0.661 (0.772)
Unemployed	0.424 (0.770)	-1.419** (0.628)	-2.329*** (0.823)
Out of Labour Force	0.886 (0.781)	-1.748*** (0.637)	-2.022** (0.836)
Retired	0.193 (1.685)	-1.556 (1.375)	-2.703 (1.802)
Work Age Ratio	0.780 (0.694)	0.604 (0.566)	0.912 (0.742)
Hours Working per Week	0.016 (0.016)	-0.025* (0.013)	-0.039** (0.017)
Business Assets	0.213 (0.755)	-0.106 (0.616)	-0.974 (0.807)
Home Ownership	-1.091 (0.687)	-0.048 (0.560)	-0.492 (0.734)
Collateralised Debt	3.801*** (0.542)	0.538 (0.442)	0.877 (0.580)
Unsecured Debt	-0.615** (0.309)	-0.073 (0.252)	-0.682** (0.330)
Constant	-1.792 (1.992)	0.296 (1.625)	-2.306 (2.130)

Note:

*p<0.1; **p<0.05; ***p<0.01

Source: HFCS 2010, Own representation.

This table shows the results from an OLS regression for 523 single households in Germany, 2010. The dependent variables are the value of the household's other real estate in column (1), shares in column (2), and mutual funds in column (3) in 2010 Euros. The main independent variable of interest, female, is a binary variable, equal to 1 if the household head is a woman and 0 otherwise. All variables representing a monetary value have been subjected to an inverse hyperbolic sine transformation. IMR represents the Inverse Mills Ratio accounting for self-selection into single households and has been obtained from a Heckman selection model. For further information please consult with the authors.

Table 7: Deposits, Bonds and Pensions/Whole Life Insurances of Single Households, Germany, 2010

	<i>Dependent variable:</i>		
	Deposits (1)	Bonds (2)	Pension/Whole Life Insurance (3)
Female	0.343 (0.301)	-0.050 (0.193)	0.196 (0.476)
IMR	-0.032 (0.852)	0.201 (0.547)	0.346 (1.348)
Age 25-34	-0.096 (0.388)	0.086 (0.249)	1.407** (0.614)
Age 45-60	-0.447 (0.362)	0.332 (0.232)	0.462 (0.572)
Primary education or lower	0.710 (1.153)	-0.100 (0.740)	-2.374 (1.824)
Upper secondary education	1.518*** (0.579)	0.035 (0.372)	0.108 (0.916)
Tertiary education	3.021*** (0.603)	0.379 (0.387)	1.547 (0.954)
One Child	-0.236 (0.445)	0.238 (0.286)	0.225 (0.704)
Two Children	-0.297 (0.594)	0.242 (0.382)	0.485 (0.940)
Three+ Children	0.338 (1.102)	0.115 (0.708)	2.153 (1.744)
Single	0.804 (1.161)	0.801 (0.746)	0.526 (1.837)
Divorced	0.555 (1.085)	0.551 (0.697)	-0.793 (1.717)
Widowed	0.399 (1.244)	0.012 (0.799)	-0.416 (1.968)
Large Inheritance	0.349 (0.602)	0.395 (0.387)	1.163 (0.953)
Small Inheritance	0.434 (0.332)	-0.111 (0.213)	1.155** (0.526)
Temporary Employment	-0.762 (0.504)	-0.164 (0.323)	-2.380*** (0.797)
Employer	-0.935 (1.050)	1.212* (0.674)	2.409 (1.661)
Self Employed	-1.091* (0.616)	-0.406 (0.396)	-0.457 (0.975)
Unemployed	-1.862*** (0.657)	-0.678 (0.422)	-0.998 (1.040)
Out of Labour Force	-0.434 (0.667)	-0.542 (0.428)	-0.799 (1.055)
Retired	1.307 (1.438)	-0.498 (0.924)	-0.758 (2.275)
Work Age Ratio	0.954 (0.592)	0.332 (0.380)	2.097** (0.937)
Hours Working per Week	0.020 (0.014)	-0.011 (0.009)	0.037* (0.022)
Business Assets	0.355 (0.644)	0.035 (0.414)	-1.382 (1.019)
Home Ownership	1.708*** (0.586)	0.165 (0.376)	0.643 (0.927)
Collateralised Debt	-0.314 (0.463)	0.102 (0.297)	1.065 (0.732)
Unsecured Debt	-1.283*** (0.263)	-0.156 (0.169)	-0.139 (0.417)
Constant	4.700*** (1.699)	-0.453 (1.091)	0.572 (2.689)

Note:

*p<0.1; **p<0.05; ***p<0.01

Source: HFCS 2010, Own representation.

This table shows the results from an OLS regression for 523 single households in Germany, 2010. The dependent variables are the value of the household's deposits in column (1), bonds in column (2), and pensions/whole life insurances in column (3) in 2010 Euros. The main independent variable of interest, female, is a binary variable, equal to 1 if the household head is a woman and 0 otherwise. All variables representing a monetary value have been subjected to an inverse hyperbolic sine transformation. IMR represents the Inverse Mills Ratio accounting for self-selection into single households and has been obtained from a Heckman selection model. For further information please consult with the authors.

Imprint

Editors:

Sigrid Betzelt, Eckhard Hein, Martina Metzger, Martina Sproll, Christina Teipen,
Markus Wissen, Jennifer Pédussel Wu (lead editor), Reingard Zimmer

ISSN 1869-6406

Printed by
HWR Berlin

Berlin, July 2024