FI Analysis No. 42

Gender differences in investment behaviour

By: **Mathias Lien Oskarsson ***

Summary

Financial saving is central to individuals' economic security and long-term goals such as buying a home and retirement. Small differences in returns can over time have a significant impact on wealth and thus on an individual's personal finances. Differences in investment behaviour therefore contribute to inequalities in economic welfare.

There are differences in investment behaviour in many dimensions. The purpose of this analysis is to study the stock market investments of women and men. The analysis focuses on stock investments during different periods of life, the risks individuals take, and the returns they receive. Highlighting these issues is important for Finansinspektionen's (FI) work with financial education and consumer protection.

The study confirms previous results showing that women are underrepresented in the stock market. The differences arise as early as three years of age, which shows that adults more often buy stocks for boys than for girls. We also see that men generally have larger stock portfolios than women throughout life, although women increase their stock wealth later in life.

On average, women have a 0.13 per cent higher return in their stock portfolios than men do. One explanation may be that men tend to trade more opportunistically by trying to time the market, which reduces their returns. However, among the wealthiest individuals, the same gender difference in returns is not observed.

Men take more market risk in their stock portfolios than women do. At the same time, men seem to be better at managing the risk they take by more often diversifying their portfolios by buying different securities. A certain amount of financial risk is not bad in itself. Rather, it is often necessary to take some risk to generate returns on capital. But too much financial risk is not good, as excessive risk can lead to large losses. One of the simplest ways to reduce unnecessary risk-taking is to diversify a stock portfolio by spreading investments across several different stocks.

12 december 2023, FI Ref. 23-34272

* The author would like to give special thanks to Alberto Crosta, Agneta Blomquist, Annika Otz, Annika Zervens, Erika Goldkuhl, Jenny Rolling, Johan Berg, Lars Hörngren, Michael Andersson, Stefan Palmqvist and Thomas Nielsen.

The FI analyses have been presented at an internal seminar at FI. They are approved for publication by an editorial board.

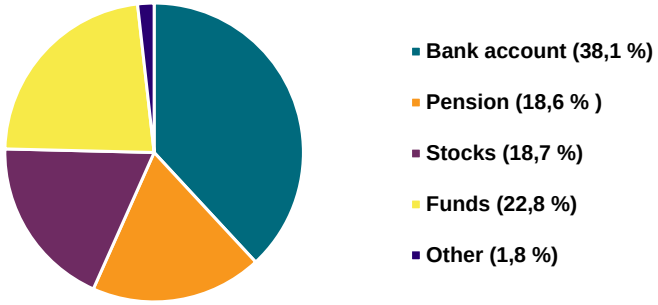
We analyse differences in investment behaviour

Saving throughout life is important for an individual's financial security and ability to meet future expenses, as well as to plan for unexpected life events – such as unemployment or illness – and for retirement. There are many ways to save, and different people choose different forms of saving. Most decisions that an individual makes about their savings often concern financial savings, which means investments in assets such as stocks, funds, or a savings account with interest. Of these, bank deposits constitute the largest portion of financial savings (see Diagram 1).

Even within financial savings, there are significant differences in how individuals choose to allocate their money. The differences depend on many things, but often it is about general factors like age, personal preferences, and risk appetite – the willingness to invest in risky assets. Gender differences have also been shown to play a role in investment decisions, as women often invest less in stocks and tend to consciously take less financial risk in their portfolios.[1]

1. Diagram 1. Distribution of aggregate financial savings

Per cent



Source: Swedish Bankers' Association
Note: Swedish households' financial assets in 2022.

How people save also tends to change over their lifetime. Younger individuals often have a higher risk appetite and buy stocks to a greater extent, while older individuals often focus on safer investments, such as bonds or interest-bearing savings accounts.

Risk appetite also varies among individuals and affects the choice of investments. Some people are more willing to take financial risk, with the hope of higher returns. They often prefer to choose stocks or other riskier assets. Other individuals prefer a cautious strategy. Therefore, they opt to purchase less risky products and thus often receive lower returns.

[1] See, for example, Sapienza et al. (2009), which links financial risk-taking to the individual's testosterone level.

When we talk about risk in financial savings, it is important to emphasise that risk in itself is not a negative term. Often, those who invest need to take a certain risk in order to generate a return. But what constitutes an appropriate amount of risk varies from case to case, not least depending on personal characteristics and financial circumstances.

We analyse savings in equities

Small deviations in returns can, over time, create large differences in wealth. This affects the individual's financial security and ability to achieve long-term goals, such as buying a home or securing a stable pension. Understanding the differences in how individuals choose to invest their money is therefore not only important for the individual's financial situation, but also for the need for financial education, consumer protection, and gender equality issues.

The purpose of this analysis is to study and describe differences in investment behaviour between men and women. To examine differences in behaviour and preferences, we focus on three overarching areas: investments at different life stages, returns, and the risk in the portfolios. An increased understanding of gender differences provides a basis for increasing understanding of the financial market from a gender equality perspective. Additionally, increased understanding can eventually lead to measures that contribute to FI's ongoing work for strong consumer protection.

Research on investment behaviour often focuses on studying individuals' stock savings, which we also do in this analysis. This is because decisions about stock investments are often individually based, thereby giving a deeper insight into the person's preferences and handling of risk. Fund saving is also an important part of financial saving for many. However, fund investments are more influenced by external professional advice, and the investors managing the funds are often professional. This means that the individual's decision mainly involves choosing the type of fund. Even though these decisions can also say something about individuals' investment behaviour, they do not provide the same detailed insights as stock investments. Furthermore, there is currently no unified data that includes a person's entire financial savings, making it difficult to analyse individuals' total financial savings.

At the aggregate level, stock savings constitute about 19 per cent of Swedish households' financial savings (see Diagram 1). Today, we are lacking complete data that allows us to analyse at an aggregate level how the relationship between stock savings and other financial savings differs between genders. According to FI's sample-based survey, however, the differences between men and women among customers at large banks are small.[2] But consumers often have more than one bank and choose to use different banks for different types of services. Many of those who trade actively in stocks tend to do so through online brokers like Avanza and Nordnet, and we can see

[2] In FI's household survey, women have 13 per cent of their financial capital saved directly in stocks. The corresponding figure for men is 14 per cent.

that three out of four have traded through these actors at some point.[3] Avanza reports that women have 14 per cent of their pension savings in stocks with the bank, while the corresponding figure for men is 26 per cent.[4] Women instead save to a greater extent in funds. These differences affect to what extent we can draw general conclusions from our analysis as, for example, higher risk-taking in stock investments can be offset by the lower risk often associated with fund saving. Despite this, our results provide important indications of differences between how men and women invest.

Saving in well-diversified funds with low fees can often be a better option for retail investors because it automatically provides the benefits of diversification while also reducing the need to be attentive to major events to adjust the portfolio. For the average retail investor, it is therefore often a convenient and more advantageous alternative to individual stock investments.

We use financial transaction data in our analysis

In the analysis, we use data from the Financial Supervisory Authority's (FI) transaction reporting system (TRS). TRS contains information about individual investors' purchases and sales of stocks. Thus, we base our analysis on individuals' trading of stocks and not necessarily their holdings. We then construct portfolios based on individuals' stock trading during the period from 1 January 2018 to 30 June 2022. Since we do not have the data capacity to study all transactions for all persons, we draw a random sample containing 88,571 men and 47,486 women.

According to Euroclear, 60 per cent of all Swedish stockholders are men, compared to our sample where 65 per cent are men.[5] One explanation for the difference might be that women tend to trade less frequently, which we observe in the analysis. This means that women are less likely to have made a transaction during the studied period, which in turn means they are less likely to be included in the sample compared to men. For a more detailed description of the sample and discussion on the handling of potential bias, see Appendix 1.

Women are underrepresented in the equities market

According to a previous survey conducted by FI, men claim to be more willing to take financial risks than women.[6] The survey also showed that women generally consider themselves to have poorer financial capability than men do. These results are often interpreted as the view of financial capability being a partial explanation for why

[3] 74 per cent of the individuals in our sample have at some point traded through online brokers.
[4] Avanza (2021).
[5] Euroclear (2023). Euroclear is currently the only securities depository in Sweden.
[6] FI's household survey (2023).

women have smaller financial savings and take less financial risk.[7] Another partial explanation is that women generally have lower incomes, which means they save less in absolute terms. Lower total savings are usually also linked to lower risk-taking, which can be equated with the individual placing a smaller portion of their savings in risky assets like stocks.[8]

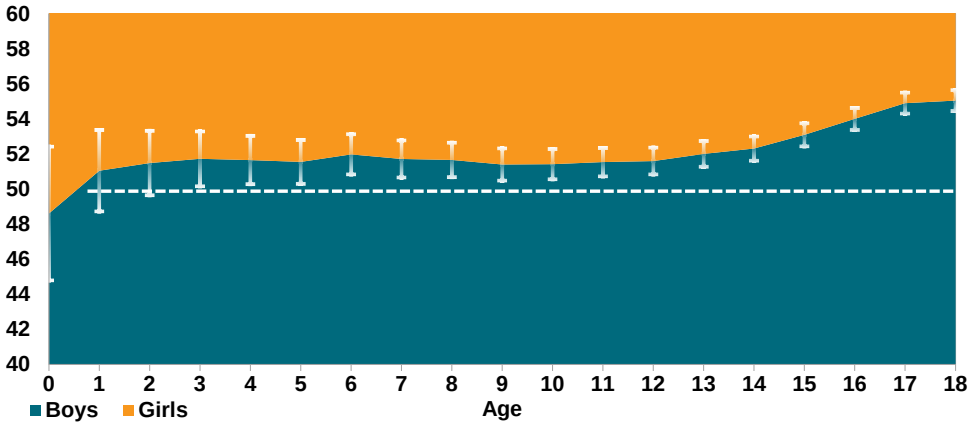
What we can see in this analysis confirms this picture. Of the random sample used for the analysis, only 35 per cent are women. Moreover, women only own 13 per cent of the total stock capital in the sample. This shows that women are not only underrepresented in numbers but also in terms of the invested amount in stocks. That women have less exposure to stocks means that they generally receive lower returns on their savings capital, since these assets have historically had a better return than, for example, a savings account. This is also evident in that men pay just over three-quarters of all tax on the sale of securities and company shares.[9]

Differences arise at a young age…

Differences in investment behaviour change over time, and as part of this analysis, we have examined stock trading among young people – up to 18 years old. Our results show that already at the age of three, it is evident that boys own stocks to a greater extent than girls (see Diagram 2).

Diagram 2. Share of boys and girls under the age of 18 with stock ownership

Per cent



Source: FI

Note: Cumulative – summed up to the year on the x-axis – distribution for the entire observable population between the first quarter of 2018 and the second quarter of 2022. The error bars represent a 95 per cent confidence interval that the distribution is not even and are calculated using a two-sided binomial test. The distribution is adjusted according to Statistics Sweden's (SCB) statistics for the difference in birth rates between genders.

[7] Baeckström, Silvester & Pownall (2018), Jianakoplos & Bernasek (1998).
[8] Finke & Huston (2003).
[9] SCB (2019).

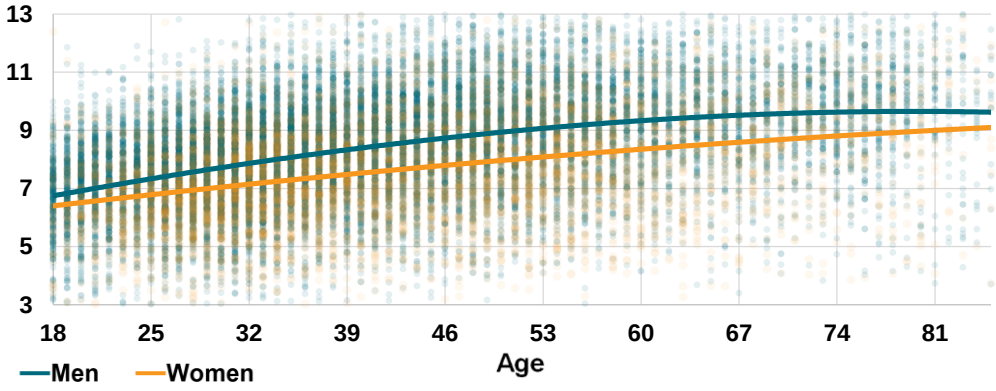
The differences we can see in the distribution suggest that parents (and other adults close to children) tend to buy stocks more often for boys than for girls, since we can assume that children of elementary school age rarely make their own investments. To adjust for the fact that more boys are born each year, we use data from Statistics Sweden (SCB) to balance the number of girls and boys.[10]

If stocks were allocated to boys and girls at an even rate, the ratio between the groups would be 50:50. As shown in Diagram 2, this is not the case, with boys being significantly more common stockowners from the age of three. It is also interesting to note that the proportion of boys with stock holdings clearly increases during the teenage years. One explanation for this could be that teenage boys are more inclined to manage their stock portfolio on their own, with their parents' approval, and then choose to take more risk.

…and continues throughout life

Men have, on average, larger stock holdings than women (see Diagram 3). This is the case regardless of age. A large part of this can likely be explained by the fact that men have higher incomes, which has allowed them to put more money in absolute terms into their financial savings. In addition, men seem more inclined to place a larger portion of their financial savings in stocks.[11]

Diagram 3. Observed portfolio value for different ages and genders



Source: FI
Note: The dots represent individual portfolios, the trend line is calculated for each group by taking the third-degree polynomial of the effect of age on portfolio value. The diagram reports the highest observed value for each individual's stock portfolio.

An additional reason why men have larger stock holdings might be that men start saving in stocks at a younger age, as seen in the results above. When we examine the

[10] We adjust the number of observed boys in our data by a factor that corresponds to the proportionally higher number of boys born each year compared to girls.
[11] Avanza (2021) and Nordnet (2019).

initial appearance of men and women in the data, it is clear that women tend to be a couple of years older than men. This means that there are relatively more men who are active in the stock market among younger people. This also shifts the total age distribution among men towards the younger end. Considering that returns grow exponentially over time, and that the stock market has risen sharply over recent decades, a person who has saved for a few years longer would also have enjoyed higher returns.

The difference between genders increases up to retirement age and then decreases. Two reasons why men have larger stock holdings are that they save more in general and they have a larger portion of their savings in stocks. The reason the differences decrease after retirement age could be because women live longer. This means that they may need to sell off their savings more slowly during retirement, while men may sell off their stocks at a faster pace to maintain their level of consumption.[12]

Women achieve higher returns while men are more well-diversified

Return and risk are two central concepts in investing that often go hand in hand. To achieve a higher return in an investment portfolio, it is often necessary to take greater risk. But, of course, taking greater risk can also lead to greater losses. In this chapter, we will highlight the main differences in how men and women manage these two critical aspects – return and risk – of investments.

Return can be affected by many things, such as economic conditions, how specific industries develop, or how individual companies perform. Additionally, the return is also influenced by the investment decisions that the individual makes, such as when to buy a stock, how often to trade or how to try to time the market. Risk, on the other hand, can be affected by everything from general market volatility to events that are specific to an individual company.

A good portfolio is typically characterised by its ability to generate a high return at a relatively low risk. However, evaluating what constitutes a good portfolio is a complex and not necessarily always a strictly objective task.[13] Depending on which measures are used, different aspects of the portfolio's performance can be illuminated. The answer to the question of what constitutes a good portfolio for a certain individual should also include the individual's other savings such as bank savings, fund investments, and pension savings in the analysis. This is because, for example, fund and pension savings

[12] The explanation is based on the life-cycle hypothesis from Modigliani & Brumberg (1954). The hypothesis describes how a rational economic agent tries to keep their consumption constant throughout life.
[13] See, for example, the discussion in Grinblatt & Titman (1989).

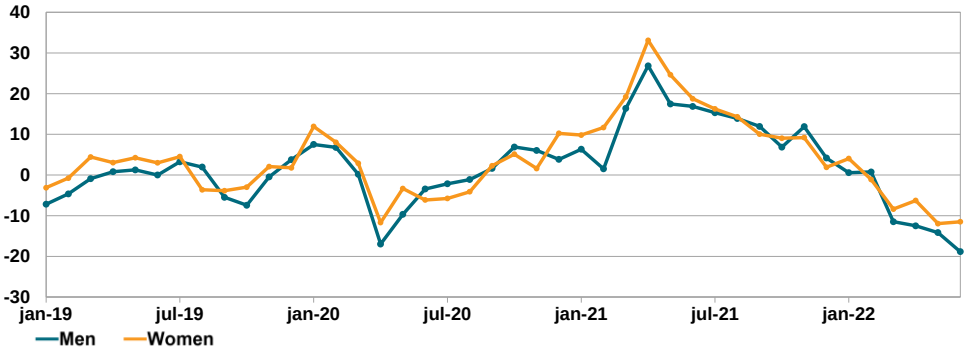
generally are of a more diversified nature, which can compensate for the more company-specific exposure an individual gets from owning individual stocks. Moreover, bank savings is an important piece of the puzzle to understand how large a portion of a person's financial savings is placed in risky assets. However, there is no comprehensive data that allow us to simultaneously study all of these metrics today. Therefore, we study the return the investor receives and the risk they take in the stock portfolios separately. Studying return and risk separately allows us to analyse different nuances of risk and return in detail, which can contribute to a deeper understanding of what drives the differences between men's and women's behaviour in the stock market.

Women have higher returns in their stock portfolios

In line with previous results, women in our study have a marginally higher average return than men (see Diagram 4).[14] Since the stock market goes up and down, however, the return varies depending on the chosen period to study. To include both ups and downs, we therefore calculate the portfolio's average return for the last 252 days at the end of each month. The reason we study precisely 252 days is that there are on average that many trading days in a year.

Diagram 4. Annual average returns for men and women

Per cent



Source: FI

Note: The diagram refers to the 252-day average return for men and women. The return in the individual stock portfolios is calculated in euros at the end of each month for each individual and adjusted to include any dividends.

In Diagram 4, we combine all holdings in individual stocks for men and women to calculate their average return. This provides a simple measure to study differences between genders. However, not all men invest in the same way, and the same applies to women.

To understand how men's and women's investment behaviour might differ, it is therefore interesting to consider other factors that could influence behaviour. Previous research has found, among other things, that wealthier individuals have higher returns

[14] See, for example, Fidelity (2023).

on their portfolios.[15] Age also tends to affect return,[16] and those who trade stocks more frequently tend to show lower returns.[17] To study how these different effects interact, we use a regression analysis to examine how portfolio returns vary with gender, age, portfolio value, the number of unique stocks in the portfolio, and the number of transactions an individual makes.

Portfolio return – the dependent variable – represents how much a certain individual's portfolio of various individual stock investments increases or decreases in value over a certain period. And the equation indicates how much of the variation in the dependent variable can be explained by the variation in the independent variables.

Previous research has shown that wealth can affect return. Therefore, we include the portfolio's value as an approximate measure of the investor's wealth. Furthermore, more stocks in a portfolio often suggest better diversification, which can reduce risk and stabilise return. Additionally, the degree of diversification can provide an indication of how sophisticated a person is in their investment decisions. More sophisticated investors tend to have more diversified portfolios. In the analysis, we study portfolios with at least five stocks. But the results are robust as to whether we would increase or decrease that threshold.

When we study all individuals and take all the aforementioned variables into account, we see that women generally have a 0.13 per cent higher return than men – see Regression (I) in Table 1. Although the difference between genders is small, it is statistically significant. The results also suggest that return slightly increases with age, even though the effect is relatively low. One explanation might be that older individuals have more experience with financial decisions, implying they take unnecessary risks less often.[18]

Investors with larger portfolios tend to have higher returns. This can reflect several things. For example, investors with larger portfolios may have access to better investment advice, but they might simply have more experience and knowledge as well. Another explanation could be that better investors have larger portfolios as a result of higher returns. To see if there are differences in these respects among different levels of wealth, we divide them into three groups based on observed portfolio value. The largest group is those with the lowest 90 per cent of stock wealth. They also dominate the total regression; therefore, most observed coefficients in Regression (II) do not differ from the total regression, Regression (I).

[15] Bach, Calvet & Sodini (2015).
[16] Korniotis & Kumar (2011).
[17] Grinblatt & Keloharju (2000).
[18] Korniotis & Kumar (2011).

Table 1. Regression of individuals' portfolio returns

Strata (highest observed portfolio value)	(I) All individuals	(II) Bottom 90%	(III) Top 10%	(IV) Top 1%
Gender (Dummy, M = 1)	-0.0013 (-4.09)**	-0.0013 (-3.74)**	-0.0006 (-1.00)	0.0038 (1.25)
Age	0.0001 (3.48)**	0.0000 (2.80)**	0.0001 (3.59)**	0.0004 (3.71)**
Number of unique stocks in portfolio	0.0001 (3.27)**	0.0002 (6.03)**	0.0000 (-2.07)*	-0.0001 (-1.26)
Number of transactions (ln)	-0.0001 (-11.58)**	-0.0001 (-6.43)**	-0.0002 (-11.4)**	-0.0001 (-2.83)**
Portfolio value (ln)	0.0021 (14.02)**	0.0016 (13.38)**	0.0043 (8.74)**	0.0050 (5.71)**
Degrees of freedom	162,398	126,937	31,224	4,237
R Squared Adjusted	0.0065	0.0033	0.0141	0.0223

Source: FI

Note: Regression according to the formula Portfolio Return = $\beta X + \gamma D + \varepsilon$, where X represents independent variables, D represents dummy variables, and ε is the residual. * = significant at the 5% level, ** = significant at the 1% level. This refers to a Fixed Effects (FE) regression model to account for time effects, with calculations made for each month-end during the period January 2019–June 2022. The t-value is calculated using White heteroskedasticity-consistent standard errors. Portfolio value and the number of transactions are logarithmised due to skewed distributions. The regressions are based on the filtered sample.

There is no significant difference in returns between women and men among the 10 per cent and 1 per cent wealthiest individuals in the sample; see estimates for gender in Regressions (III) and (IV). One explanation could be that these individuals have better insights into stock investments and/or have access to professional advice or even professional wealth management that helps them make more informed investment decisions, regardless of gender.

Individuals with more than five unique stocks in their portfolio tend to have higher returns, and generally, there is a positive relationship between the number of stocks and return. When examining the differences between wealth levels, it appears that this relationship diminishes for wealthier individuals. This can likely be explained by them already having more stocks in their portfolios. The 10 per cent with the largest stock wealth have an average of 12 stocks, and those in the top 1 per cent have an average of 18 stocks.

The benefit of diversification mainly comes from lower risk, making it hard to argue that an individual who invests in an additional stock automatically increases their return. Rather, this shows that those with more stocks in their portfolio likely have better financial knowledge on how to manage a portfolio. Unfortunately, we have no information on individual investors' financial knowledge. Moreover, it is easier for individuals with larger portfolios to diversify since the transaction costs per stock purchase often become lower when trading larger amounts.

We can also see that investors who make more transactions generally achieve lower returns. Even though we do not account for direct trading costs, such as brokerage fees, in this analysis, it is interesting to note that more transactions tend to lead to worse returns. Previous studies also show similar results.[19] One explanation for this could be that trading driven by attempts to time the market's ups and downs or react to short-term news often leads to poorer outcomes. This negative effect on return is greater among men as they tend to trade more frequently.

Women take less market risk in their stock portfolios, men diversify company-specific risk better

In the context of investing, risk is not necessarily negative. Normally, an investor needs to take a degree of risk in their investments to generate a return. However, what constitutes an appropriate level of risk differs from person to person. To reduce risk-taking, most investors diversify, meaning they buy many different stocks. This is based on the traditional wisdom of not putting all your eggs in one basket. By spreading the portfolio across several different stocks, each individual stock affects the overall portfolio less if something goes wrong. Diversification in this context means trying to reduce idiosyncratic, or company-specific, risk. What remains is market risk, i.e., the common risk attributable to all stocks.

Fact box: Market risk and company-specific risk

Market risk is the part of a stock portfolio that cannot be diversified away. Idiosyncratic risk, or company-specific risk, is the risk present in each individual stock.

Example: Imagine sailing on the ocean. Market risk is like the weather conditions – storms, currents, waves – that affect all boats, regardless of their design or the captain's skill. It is uncontrollable and impacts everyone in the market, just as a storm affects all sailors. In the financial world, this could, for example, be broad economic changes or political factors. On the other hand, idiosyncratic risk involves aspects that only concern your own boat or your sailing skills. These are unique to you and affect only your journey. In the financial world, this includes company-specific factors, such as management competence or how well the company's products sell.

Two metrics commonly used in the financial world to measure these phenomena are

- **Standard deviation**, which measures how the prices of individual stocks move. A high standard deviation, meaning higher price variation, indicates greater uncertainty and thus higher risk.
- **Beta**, which measures how much a portfolio is exposed to market risk. A rule of thumb is that a portfolio with Beta = 1 moves roughly as much as the underlying market. A portfolio with Beta = 0.7, on average, rises by 0.7 per cent when the overall market rises by 1 per cent, and vice versa.

[19] Odean (1999).

Men generally have a slightly higher portfolio beta than women, meaning that men are more exposed to market risk in their stock portfolios. A higher beta implies higher risk but also the possibility of higher returns. This exemplifies how it is more common for men to add additional risk to their stock portfolios with holdings in particularly risky stocks.[20]

However, portfolio beta tends to vary over time, but by studying portfolio beta using a similar regression as in Table 1, we can see that the difference is significant even when accounting for other variables describing the individual's stock portfolio. See a clearer description of the results in Appendix 2.

Despite taking more market risk, men tend to have a lower portfolio standard deviation, which measures how much the combined portfolio moves up and down. A contributing explanation for this is that we see men diversify their portfolios to a greater extent than women. In the analysis, we can see that women have portfolios that are more concentrated in fewer sectors and also are more concentrated in terms of exposure to different geographic regions. Stocks within the same sector or the same country tend to have a higher correlation – when one goes up in price, the others do too. To spread risks, it is therefore often better to buy different stocks with lower correlation. See Appendix 2 for a more detailed analysis of portfolio standard deviation.

Since we are only studying stocks in this case, we do not capture the individual's entire financial risk-taking; instead, we focus rather on stock investments. Although this allows us to analyse interesting relationships in how different people handle risk, there may be cases when it is reasonable to take more risk in a stock portfolio, for example, if the individual has invested the majority of the portfolio in well-diversified funds. Then, the broad diversification in the funds may compensate for the more company-specific risk in the stocks and thus could lead to a better overall portfolio allocation.

Using the same analogy as in the fact box above, we can say that men tend to sail in riskier waters, where the wind blows stronger and the sea is rougher. That is, they take more market risk in their investments by having higher exposure to risky stocks. This can be illustrated by men having higher beta in their portfolios compared to women. While taking more market risk, men, however, seem to be better at managing the risk they do take. So even though men sail in riskier waters, they tend to limit the risks they can influence by, for example, distributing the cargo across several different ships. This can be illustrated by the fact that their portfolio standard deviation is lower than that of women. This indicates that men diversify their portfolios to a greater extent.

[20] See, for example, FI Analysis No. 40, Lien Oskarsson (2023), where we study the trading in risky meme stocks. In that analysis, we could see that nine out of ten investors were men.

Conclusions

Financial savings affect an individual's economic welfare, and small differences in return can have a significant impact over time. By understanding the differences in men's and women's savings, it is easier to work for equal conditions that give everyone the same opportunity to make informed decisions about their finances from a young age and onwards. This analysis studies men's and women's investment behaviour in stocks throughout life, illuminated from a perspective of risk appetite and return.

Starting financial savings early for one's children can be very beneficial for them later in life since returns accumulate over time. The differences we see between genders at young ages can thus play a role in wealth distribution over the long term. This, along with the underlying reasons for the skewness between genders, would be interesting to analyse in further work.

Too frequent trading of stocks often tends to be associated with lower returns. We see this both in this analysis and in previous research.[21] That women do not "overtrade" to the same extent as men may be one explanation for why they, on average, have higher returns.[22] This illustrates that it is beneficial to take a long-term approach by staying put and not trying to time the market's ups and downs.

What has sharply risen can also fall just as sharply. Although such a risk-seeking strategy can yield good results over short periods, it has been shown that this type of strategy often leads to losses rather than gains,[23] especially when the market goes both up and down as it has during the studied period. This illustrates the importance of not taking unnecessary risks in investments, for example by not unnecessarily driving up portfolio beta. Moreover, it is possible to reduce company-specific risk by investing in several different stocks, thereby lowering the variations in the portfolio's value. Research has shown that most individuals' portfolios are under-diversified.[24] In our analysis, we can see that women, more than men, could benefit from more diversification in their portfolios.

It is crucial to make informed choices, take a healthy amount of risk in investments, and understand the importance of diversification. Therefore, investing in, for example, passive mutual funds with low fees can often be a good option for both men and women. An equity fund acts as a pre-packed basket of many stocks, and by saving in one, risk is automatically spread in one's investment. At the same time, a fund of stocks offers investors the opportunity to participate in the higher returns that stocks tend to provide compared to, for instance, bank savings.

---

[21] Odean (1999).
[22] This is observed in this analysis, but the same relationship is also reported in Barber & Odean (2001).
[23] Heimer & Simsek (2019). Frazzini & Pedersen (2014) also offer a more theoretical explanation, where they describe how stocks with higher beta tend to be overvalued and thus lead to poorer returns over time.
[24] Goetzmann & Kumar (2008).

Appendix 1: Data specification

In the analysis, we use data from the Financial Supervisory Authority's (FI) transaction reporting system (TRS). TRS contains information on individual investors' stock purchases and sales. We construct portfolios based on individuals' stock trading during the period from January 1, 2018, to June 30, 2022. Since we do not have the data capacity to study all transactions for all persons, we draw a random sample of individuals, explicitly considering the individual's gender to (theoretically) include an equal number of women and men in the sample. Despite this, the underlying sample includes 88,571 men and 47,486 women.

Since we lack information about complete holdings, we build approximate portfolios using transactions during the period, meaning we cannot include stocks acquired before 2018. The method for building approximate portfolios is in line with previous research[25] and is considered useful in the analysis to provide insights into behaviour and preferences during the studied period. However, this may lead to distortions in the selection process. For example, it is likely that those who are more interested in stock trading and thus trade more frequently are overrepresented in the sample. It is also possible that those more interested in equity markets spend more time analysing their investments, which could lead to better outcomes in their investments.

Another phenomenon is that women hold their stock investments longer than men, which we also see in this analysis (see Table 2). This means they make fewer transactions and may therefore have a lower chance of being included in the dataset. In this regard, it could be that the median woman who makes enough transactions to be included in the dataset is proportionally more interested in stock trading than the median man. By including variables for the number of stocks in the portfolio and the number of transactions made in the regressions, we try to adjust as much as possible for these differences between individuals.

For the part of the analysis concerning risk and return, we filter so that we only retain individuals who had at least five stocks in their portfolios during the period. We do this to focus on individuals' portfolios with a composition of several different stocks. Including all individuals would mean that the return for those with only one stock in their portfolio would be exclusively made up of that stock. This would, in turn, lead to increased variance in the return measures that are not necessarily attributable to investment behaviour.

The same applies to studying portfolio standard deviation, as we, for example, would not be able to study differences in diversification in a fair manner since it relies on owning several different stocks. After filtering, 8,099 women and 23,197 men remain. The reason why men are an even larger proportion of the filtered sample is because men

[25] See, for example, Odean (1998), which studies portfolios constructed from transaction data.

both trade more frequently and tend to hold portfolios with more stocks (see Table 2). The results presented in the regressions in Tables 1, 3, and 4 are, however, equivalent whether we increase or decrease the threshold value for the number of stocks that is used in the filtering stage.

Table 2. Descriptive Statistics of the Sample

Number, Age, Days, Per cent

	Underlying sample		**Filtered sample**	
	Men	**Women**	**Men**	**Women**
Number of individuals	88,571	47,486	23,197	8,099
Age, in years (mean)	44.2	46.1	43.8	46.0
Age, in years (median)	42	44	41	43
Number of transactions (mean)	335	145	753	363
Number of transactions (median)	64	33	229	126
Number of unique stocks in the portfolio (mean)	3.1	2.8	9.6	8.9
Number of unique stocks in the portfolio (median)	2	2	7	7
Holding period, in days (mean)	167	207	132	175
Holding period, in days (median)	90	132	84	122
Share of portfolio value in Swedish stocks (mean)	46.3%	57.6%	28.4%	38.3%
Share of portfolio value in Swedish stocks (median)	34.7%	52.5%	19.7%	27.2%

Source: FI

Note: The static values describing the Number of unique stocks in the portfolio and the Share of portfolio value in Swedish stocks refer to the value we could see for the portfolios on 30 June 2022, i.e., the last day of the studied period. The same applies to Age, which reflects the individual's age as of 30 June 2022. The remaining values refer to the values measured during the studied period.

Appendix 2: Regression of portfolio beta and standard deviation

Men generally have a slightly higher portfolio beta than women, meaning that men are more exposed to market risk in their stock portfolios. A higher beta generally implies higher risk but also the possibility of higher returns.[26] However, portfolio beta tends to vary over time. To adjust for changes over time and more closely study differences between individuals, we use a similar regression equation to the one in Table 1. But here, we change the dependent variable to study portfolio beta instead.

The regression analysis shows that the men's portfolio beta is slightly higher than the women's, as indicated by the statistically significant positive estimate for men shown in Table 3. This is in line with previous results suggesting that men generally take more market risk than women.

Table 3. Regression of beta in portfolios

	All individuals
Gender (Dummy, M = 1)	0.0242 (7.18)**
Age	-0.0009 (-3.35)**
Number of unique stocks in portfolio	-0.0184 (-3.07)**
Number of transactions (ln)	0.0011 (3.29)**
Portfolio value (ln)	-0.0038 (-8.43)**
Degrees of freedom	161,751
R Squared Adjusted	0.0184

Source: FI

Note: Regression according to the formula $Portfolio\ Beta = \beta X + \gamma D + \epsilon$, where X represents the independent variables, D represents dummy variables, and ε is the residual. The time aspect is treated as a fixed effect. The t-value is calculated using White's heteroskedasticity-consistent standard errors. The regression is based on the filtered sample.

Despite taking more market risk, men tend to have a lower portfolio variance. This can be observed by conducting a similar regression as above but with the portfolio's standard deviation instead of the portfolio's return as the dependent variable.

There is a high correlation between the portfolio's standard deviation and the number of stocks and how often the individual trades.[27] This necessitates adjusting the regression to better study just the portfolio standard deviation. After we examine the results of the

[26] We have used OMXSPI to calculate beta, but the results in Table 3 are robust even if other indices such as OMXS30, STOXX600, or MSCI World Index are used.

[27] This is because those variables are affected by the same aspects of diversification. Therefore, we treat the number of stocks in the portfolio as a factor dummy. It isolates how well the individual has diversified given a certain number of unique stocks in the portfolio. To avoid multicollinearity, we do not examine how often one trades in this regression, as a person who trades frequently also tends to have more stocks in their portfolio.

regression, it becomes evident that men have a significantly lower standard deviation in their portfolios than women.

Table 4. Regression for standard deviation in stock portfolios

	All individuals
Gender (Dummy, M = 1)	-0.0199 (-7.43)**
Age	-0.0001 (-2.96)**
Portfolio value (ln)	0.0169 (10.52)**
Degrees of freedom	161,751
R Squared Adjusted	0.0048

Source: FI

Note: Regression according to the formula $Portfolio\ Standard\ Deviation = \beta X + \gamma D + \epsilon$, where X represents the independent variables, D represents dummy variables, and ε is the residual. The number of unique stocks in the portfolio is treated as a factor variable for each level, but the results are robust if treated as a continuous variable. The time aspect is treated as a fixed effect. The t-value is calculated using White's heteroskedasticity-consistent standard errors. The regression is based on the filtered sample.

One explanation for women having higher standard deviation could be that they tend to focus on fewer sectors in their investments. This is observed when we examine the sector distributions in the portfolios. The women's portfolios have greater concentration, especially towards the healthcare sector and retail, while having lower exposure to companies in fossil fuels and the mining industry. Men, on the other hand, have broader exposure across more sectors. Men also tend to be better at spreading their risks among different geographical regions. Here, we see that women on average have 38 per cent of their portfolios in Swedish stocks, while the corresponding figure among men is 28 per cent.

However, the interpretation of this difference is not straightforward. Previous studies have shown that women instead have more geographically diversified holdings in their pension savings in funds, which may explain why it is rational for them to have a relatively higher concentration in their stock portfolios.[28] Stocks within the same sector or the same country tend to have a higher correlation – when one goes up in price, the others do too. Therefore, to spread risk, it is often better to buy different stocks with lower correlation.

Another explanation could be that women have a smaller portion of their total financial savings exposed to stocks than men do. Then, it might be reasonable to have a higher standard deviation in their stock portfolio, as this can be compensated by the fact that stock funds are generally more diversified and thus have low exposure to company-specific risks. This trade-off is even more relevant when including exposure to bond

[28] Karlsson and Nordén (2007).

funds, which tend to have an even lower risk profile than stock funds. Specifically, in bond funds, women tend to have a larger portion of their savings.[29]

In Tables 3 and 4, we see that the portfolios' beta and standard deviation decrease with age. Even though the effect is small – as we can see since the coefficients are relatively small – it is significant. This aligns with the life-cycle hypothesis, which suggests that risk tolerance decreases over time. Younger individuals have a longer investment horizon; hence, they can tolerate more short-term fluctuations in the portfolio. Older individuals, closer to retirement, focus more on ensuring their investments do not decrease in value and therefore often reduce their risk in the stock portfolio.[30]

This behaviour can also be reinforced by the effect of experience. Older individuals may have experienced more severe market downturns, which could have influenced them to be more cautious with risk.[31] Additionally, the cumulative experience and desire for a simpler investment strategy may lead older individuals to transition to a more cautious composition of their securities.[32]

[29] See Swedbank's risk index (2023), which shows that women have a 6 per cent lower stock exposure in their financial savings and instead a higher proportion in, for example, bond funds.
[30] Modigliani and Brumberg (1954).
[31] Malmendier and Nagel (2011).
[32] Agarwal, Driscoll, Gabaix, and Laibson (2009).

References

- Agarwal, S., Driscoll, J. C., Gabaix, X., & Laibson, D. (2009). *The age of reason: Financial decisions over the life cycle and implications for regulation*. Brookings Papers on Economic Activity, 2009(2), 51-117.
- Agnew, J. R., Anderson, L. R., Gerlach, J. R., & Szykman, L. R. (2008). *Who chooses annuities? An experimental investigation of the role of gender, framing, and defaults*. American Economic Review, 98(2), 418-422.
- Avanza (2021). *Så påverkar föräldraskapet kvinnors sparande*. https://blogg.avanza.se/sa-paverkar-foraldraskapet-kvinnors-sparande/ [Retrieved 2023-09-15].
- Baeckström, Y., Silvester, J., & Pownall, R. A. J. (2018). *Millionaire investors: Financial advisors, attribution theory and gender differences*. The European Journal of Finance, 24(15), 1333-1349.
- Bach, L., Calvet, L. E., & Sodini, P. (2015). *Rich pickings? Risk, return, and skill in the portfolios of the wealthy*. American Economic Review, 110(9), 2703-2747.
- Berg, F., Koelbel, J. F., & Rigobon, R. (2022). *Aggregate confusion: The divergence of ESG ratings*. Review of Finance, 26(6), 1315-1344.
- Barber, B. M., & Odean, T. (2001). *Boys will be boys: Gender, overconfidence, and common stock investment*. The Quarterly Journal of Economics, 116(1), 261–292.
- Euroclear (2022). *Aktieägandet i Sverige 2022*. https://www.euroclear.com/dam/ESw/Brochures/Documents_in_Swedish/Euroclear%20Sweden_aktie%C3%A4garrapport_2022.pdf [Retrieved 2023-10-05].
- Fidelity (2023). *Ninety one percent of women think men are better investors - here's why that couldn't be more wrong.* https://www.fidelity.ca/en/investor/investorinsights/women-better-investors/ [Retrieved 2023-09-11].
- Finansinspektionen (2023). *Många har svårt att förstå grundläggande ekonomi*. https://www.fi.se/sv/publicerat/nyheter/2023/manga-har-svart-att-forsta-grundlaggande-ekonomi/ [Retrieved 2023-09-11]
- Finke, M. S., & Huston, S. J. (2003). *The brighter side of financial risk: Financial risk tolerance and wealth*. Journal of family and economic issues, 24, 233-256.
- Frazzini, A., & Pedersen, L. H. (2014). *Betting against beta*. Journal of financial economics, 111(1), 1-25.
- Goetzmann, W. N., & Kumar, A. (2008). *Equity portfolio diversification*. Review of Finance, 12(3), 433-463.
- Grinblatt, M., & Keloharju, M. (2000). *The investment behavior and performance of various investor types: A study of Finland's unique data set*. Journal of financial economics, 55(1), 43-67.

- Grinblatt, M., & Titman, S. (1989). *Portfolio performance evaluation: Old issues and new insights.* The Review of Financial Studies, 2(3), 393-421.
- Heimer, R., & Simsek, A. (2019). *Should retail investors' leverage be limited*? Journal of Financial Economics, 132(3), 1-21.
- Jianakoplos, N. A., & Bernasek, A. (1998). *Are women more risk averse?* Economic inquiry, 36(4), 620-630.
- Karlsson, A., & Nordén, L. (2007). *Home sweet home: Home bias and international diversification among individual investors*. Journal of Banking & Finance, 31(2), 317-333.
- Korniotis, G. M., & Kumar, A. (2011). *Do older investors make better investment decisions?* The review of economics and statistics, 93(1), 244-265.
- Lien Oskarsson, M., (2023). *Vinnare och förlorare i handeln med meme-aktier*. FI-analys nr. 40
- Malmendier, U., & Nagel, S. (2011). *Depression babies: Do macroeconomic experiences affect risk-taking?* The Quarterly Journal of Economics, 126(1), 373-416.
- Modigliani, F., & Brumberg, R. (1954). *Utility analysis and the consumption function: An interpretation of cross-section data*. Franco Modigliani, 1(1), 388-436.
- Nordnet (2019). *Aktieportföljen hos kvinnor & män*. https://www.nordnet.se/blogg/kvinnor-man-aktieportfolj/ [Retrieved 2023-09-15].
- Odean, T. (1998). *Are investors reluctant to realize their losses?*. The Journal of finance, 53(5), 1775-1798.
- Odean, T. (1999). *Do investors trade too much?* American economic review, 89(5), 1279-1298.
- Sapienza, P., Zingales, L., & Maestripieri, D. (2009). *Gender differences in financial risk aversion and career choices are affected by testosterone*. Proceedings of the National Academy of Sciences, 106(36), 15268-15273.
- SCB (2023). *Befolkningsutvecklingen i riket efter kön.* https://www.statistikdatabasen.scb.se/pxweb/sv/ssd/START__BE__BE0101__BE0101G/BefUtvKon1749/table/tableViewLayout1/ [Retrieved 2023-09-07].
- SCB (2019). *Kapitalinkomster 2019*. https://www.scb.se/contentassets/021d53d18de04880ad8ad118c69a68ad/he0110_2019a01_br_he50br2102.pdf. [Retrieved 2023-09-11].
- Swedbank (2023). *Swedbanks riskindex: Skillnader i aktieexponering mellan män och kvinnor*. https://mb.cision.com/Public/67/3713435/9a7d838530bc2108.pdf [Retrieved 2023-10-11].