Occasional paper

Comparing Wealth Effects of Saving and Index Investment

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Summary

The AFM has researched for which types of Dutch households it may be suitable – under particular circumstances – to invest part of their savings. European policy debates focus on increasing the number of retail investors on the European capital markets. Investing can help households to increase their assets in the long term but carries risks. It is important for households to accumulate a wealth buffer, as this enables them to cope with a (temporary or permanent) loss of income, to buy a house, to pay for the costs of higher education or healthcare, and to accumulate additional retirement assets.

In 2021, the AFM repeatedly noted, including in its Trend Monitor (*Trendzicht*), that the number of Dutch retail investors was growing. Investing has recently become more accessible to the general public due to several factors, such as lower transaction and other investment costs, and the availability of investment apps. Products are now easily tradeable, giving investors quicker and easier access to the money they invest. Partly due to the coronavirus pandemic induced saving surplus, the number of investing Dutch households has increased significantly. Surveys suggests that approximately 1.9 million households (about 24%) are now investing (AFM Trendzicht, 2021), slightly exceeding the previous peak of 1.8 million (about 23%) recorded in 2006 (CBS Statline). Consequently, the percentage of Dutch households that invest is now comparable to the European average. Despite a recent increase in the total amount invested (Dutch households invested EUR 3.7 million more in 2020), the amount of capital invested as a percentage of total household assets remains below the European average (EFAMA, 2020). This is partly due to the fact that Dutch households already accumulate assets through pension schemes (an institutionalized form of investment), which means there is less need for them to invest privately.

At the same time, there are still many Dutch households that don't invest, despite having large balances in savings accounts. Inflation and low interest rates are eating into these savings of non-investing households, making alternative sources of yield relatively attractive.

In this study, we have explored the risks and opportunities presented by passive investment in a global index fund for Dutch households that don't independently invest in the stock market, but do have sufficient wealth buffer to invest. There are also many other ways for households to invest, but these were not included in this study. In addition, we assessed whether Dutch households that do invest in the stock market have a sufficient wealth buffer. The wealth buffer we applied in our study is based on the buffer for household expenses set by Nibud, to which we added an income buffer for self-employed workers. Nibud is an independent Dutch institution that provides information and advice on financial matters to households. Depending on their personal circumstances, Nibud advises households to maintain a buffer to be able to immediately pay for major expenses that unexpectedly arise and cannot be put off. We analyzed the financial situation of Dutch households based on administrative data provided by Statistics Netherlands (CBS), which contain information on Dutch households' finances, including the value of their investments, savings, and current account balances.

For households that don't invest, we created an 'alternative universe' in our study, in which they invested their savings in excess of the buffer. In our study, we analyzed how much households would approximately gain or lose by investing in a passive index fund consisting of shares, compared to putting this money in a savings account. To this end, households bought positions in the index fund when their income situation allowed it and sold them when necessary to pay for household expenses. To ensure a realistic estimate of potential yields, we performed simulations based on long-run historical data on interest rates and simulated index investment returns by relying on a Geometric Brownian Motion with an average annualized gross return

of 7.4% and a Sharpe ratio of 0.55. In the simulations, we assumed a cost percentage of 0.6% of the amount invested.[1]

Based on the administrative data, we observed that in 2019, 11% of the 1.1 million investing households (approximately 124,200 households) did not meet the recommended wealth buffer in 2019. We assessed this by adding up the balances in current accounts, savings accounts and investment accounts. Households need to have buffers to cover unexpected expenses or a loss of income. But many households – particularly young people in salaried employment investing savings – have insufficient buffers to cope with setbacks in their finances.

In 2019, 3.1 million of the over 5 million non-investing households had sufficient buffers to cope with setbacks. These households' savings met or exceeded the recommended wealth buffer in 2019. The median savings amount of these households was EUR 32,300. After deducting the personal recommended wealth buffer, that leaves EUR 20,300 in savings.

Over a period of nine years, households with sufficient buffers achieve a higher yield by investing than by saving in 79% of the simulations when investment costs are excluded. This drops to 77% when the costs of 0.6% of the investment input are included. This percentage increases when a longer investment horizon is applied, due to compound returns. In 21% of the simulations (23% with costs included), investing generates a lower yield for the observed group of households than saving. This is the case in simulated periods of stock market losses or relatively high savings interest rates.

The simulations show that if these households were to invest the amount in excess of the personal recommended wealth buffer in a passive index fund with an average annualized gross return of 7.4%, they would annually earn about EUR 895, excluding costs) more than they would if they would save. Households would earn EUR 810 after deducting investment costs of 0.6%. This return depends in large part on the amount that can be invested, and this varies across households and over time. Households with an average of EUR 5,000 to 15,000 in savings to invest achieve an annual median yield of EUR 850 gross, excluding costs; for households with EUR 15,000 to 30,000 in savings, this amounts to around EUR 1,900 per year. For households with less than 5,000 to invest, yields are much lower. For the category with EUR 2,500 to 5,000 to invest, the yield is around EUR 350, excluding costs.

In bad stock market years, households may incur significant losses. In simulations with the worst 1% of investment returns, the average (median) loss incurred by households over a period of 9 years totaled EUR 4,900 (excluding costs). When investment costs of 0.6% are included, this adds up to a loss of EUR 5,100. In the study we found that non-investing households with savings in excess of the wealth buffer were generally able to maintain their original spending pattern if we let them invest and incur losses. Overall, the probability that households would no longer be able to maintain their desired level of expenditure was 0.2%. This shows that maintaining a wealth buffer provides protection. Nonetheless, households can incur significant losses.

In this study, we simulate the returns of passive investment in an index fund, when households invest in other ways, risks can be much greater. According to a recent study by AFM, based on survey data, around 20% of investing households invested passively in an index fund in 2021 (ESB, 2021). Passive investment involves tracking the market as a whole, whereas active investors focus on anticipating price fluctuations.

[1] The cost percentage of 0.6% is based on 0.4% instrument costs and 0.2% service costs, which is in line with the costs typically charged by Dutch investment service providers. In this way, we covered most of the costs of investing. Transaction costs were not included. The costs of Dutch funds and trackers are often lower than those of instruments from other European countries, because the Netherlands has a ban on commission. When investing in funds or trackers from these countries, a higher cost percentage should be assumed.

Scientific research shows that on average, the returns achieved by retail investors are 1.5% lower than market returns, both gross and net of costs, but individual investors' returns vary widely (For an overview, see Barber & Odean, 2013). The main reasons for the lower returns by retail investors are that they tend to trade too often (resulting in high transaction costs) and don't sufficiently diversify their portfolio (resulting in risky portfolios and significant fluctuations in returns) (AFM, 2015; Barber & Odean, 2013; Barber et al., 2014; Hofman et al., 2014, Egan, 2019, Bauer & Cosemans, 2008).

A lower investment, higher costs or a major change in economic conditions can also lead to different results. In our study we applied a rule of thumb whereby only households with savings in excess of the wealth buffer invested in an index fund. Depending on personal goals, age, conditions and risk appetite, it may be more appropriate for households not to invest, to invest a smaller amount, or to invest more cautiously (for example, by investing part of their savings in government bonds). Higher costs, or a different investment cost structure than applied in this study, will also affect the return. When interest rates increase, the relative benefits of investing over saving will diminish significantly. With a stable savings return of 2%, for example, the annual median opportunity costs decrease from EUR 895 to EUR 685 (excluding costs), and with a stable savings return of 4%, they decrease to EUR 455 (excluding costs).

Investing is not advisable for certain types of households but presents opportunities to others. We can conclude that investing was not advisable for 11% of households in 2019, as their savings were below the recommended wealth buffer. At the same time, there is a group of 3.1 million households for which investing presents significant opportunities in the long term, provided they invest sensibly.

Retail investors who wish to invest (independently or with assistance) to accumulate assets will first need to ask themselves if they have a sufficient buffer to cope with setbacks in their household finances. In addition, they need to consider if they are willing to accept the risks that come with investing. The decision whether to invest on the stock market will always be a personal one that depends on one's financial goals, risk appetite, investment horizon, financial situation and alternative investment opportunities.

According to the scientific literature, the best strategy for retail investors is to invest in a well-diversified, low-cost portfolio, such as a passive index fund, to avoid common investor mistakes. Investment service providers can support households in this by making it as easy as possible to choose a sensible investment strategy. Offering products that suit the target group, a carefully designed decision-making environment and customer-friendly information can contribute to this.

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Introduction

Given the current low returns on savings accounts and the accessibility of retail investment options, investing savings appears to be an increasingly attractive way for households to accumulate a wealth buffer. In recent years, many new ways of investing have emerged. New (online) forms of retail investing, (guided) execution-only channels and robo-advice came onto the market. Retail investing has become cheaper, costs are now more transparent, and investors can more easily convert invested assets into cash. Consequently, retail investors, even those with a smaller budget, can now hold well-diversified investment portfolios.

Survey research suggests that the number of Dutch households investing has increased to approximately 1.9 million households (about 24%) in 2021, partly due to the coronavirus pandemic. This figure slightly exceeds the previous peak of 1.8 million (about 23%) recorded in 2006.[2] The percentage of Dutch households that invest is comparable to the European average. Despite a recent increase in the total amount invested,[3] the amount of capital invested as a percentage of total household savings remains below the European average (EFAMA, 2020). This is partly due to the fact that Dutch households already accumulate assets through pension schemes (an institutionalised form of investment).

At the same time, there are still many Dutch households that put all their savings in bank deposits at low yield. Relying solely on traditional savings accounts may prevent these households from accumulating much needed assets for the short and longer term. The flexibilisation of the job market, the stricter mortgage lending requirements faced by first-time home buyers, the higher contributions towards their children's education, and a preference for early retirement all increase the need to accumulate assets.

Based on data from the Dutch Municipal Register spanning the years 2011-2019, this study assessed whether households investing in the stock market had a sufficient wealth buffer and analysed the potential financial implications of investing for non-investing households. To this end, we estimated the 'opportunity costs' of saving (or: not investing) for Dutch households that currently don't invest, but do satisfy a minimum wealth buffer requirement. This study thus assessed the potential financial gains from (increased) private investment. Furthermore, the rich data set from the administrative records allowed us to examine what financial vulnerabilities different types of investing may cause, whether investment losses could lead to financial problems, and whether investment gains would make currently vulnerable households (more) resilient to financial setbacks.[4]

We used an investment heuristic where we passively 'invested' all household savings in excess of a household-specific wealth buffer in an index fund. We simulated returns for this index fund using a Geometric Brownian Motion with an annualized gross return of 7.4%. We compared the returns of investing with the returns of saving. The savings returns were simulated using simulations based on interest rate data from the Dutch Central Bank (DNB) The personal recommended wealth buffer was computed based on buffer for expenses advised by Nibud,[5] which relies on household characteristics that are predictive of the amount of unexpected expenses (taking into account variables such as home and car ownership and household

[2] See: https://opendata.cbs.nl/statline/#/CBS/nl/dataset/83834NED/table?dl=40324 .

[3] Households invested EUR 3.7 million more in 2020. As a percentage of the increased wealth on current and savings accounts, the additional deposits in 2020 were still relatively low compared to 2016 (0.009% in 2020 versus 0.06% in 2016) (DNB, 2021).

[4] This research shows how much opportunity costs households can expect in an investment horizon of up to 9 years. The estimated opportunity costs for households during the observed period are likely to be an underestimate of the returns people can achieve during their lifetime. Many people will have been able to invest for longer than the observed period, i.e. in a different household composition, or within the same household in the period after 2019 or before 2011.

[5] Nibud (National Institute for Family Finance Information) is an independent Dutch institution that gives information and advice to households on financial matters and provides policy advice to prevent excessive lending.

composition), and an additional buffer for unexpected loss of income.). This personal wealth buffer varies between EUR 4,500 and 30,000.

The potential positive returns found in this study do not imply that such returns are attainable for retail investors who take a different approach. The investment heuristic was used to obtain an indication of an upper bound of achievable returns with index investment and will not be individually optimal or desirable for all households. Because of personal goals, investment horizon and risk preferences, it may be more appropriate for households to invest none, or less of their savings, or to invest more cautiously (investing part of their savings in government bonds for example). In practice, actual returns will also differ from the returns that are theoretically achievable, because people do not trade optimally. Although it is now possible in the Netherlands to hold a diversified portfolio at low cost, for example through index funds, research from behavioural economics shows that people often fail to do this in practice. People often keep inappropriate products, take costs insufficiently into account, trade too often and diversify too little, and as a result take an unnecessary amount of risk and therefore miss out on returns (Barber & Odean, 2013; Barber et al., 2014; Hofman et al., 2014; Egan, 2019; Bauer & Cosemans, 2008.). However, even with a passive strategy and a well-diversified portfolio with low-cost funds, investing carries inherent risks. Bad investment results can lead to people no longer being able to make the expenditures they would like to make or to achieve their investment goals.

In this study we first discuss the data sources that we used for our analysis. Next, we discuss the personal recommended wealth buffer we applied and describe the households that currently invest even though they do not have sufficient buffer and the group that currently does not invest but does have significant buffer. The subsequent section discusses the methodology used to compute investment returns. Subsequently, we present the results on both the rewards and risks of index investment as compared to saving. Thereafter, we discuss the effects on financial resilience due to index investing. In the final section we present the conclusions from our study.

Data

To analyse the financial consequences of the decision by households to save instead of invest, we used data on all Dutch households from Statistics Netherlands (CBS) for the years 2011-2019. Data from the Dutch Tax and Customs Administration are linked to data from the Dutch Municipal Register. The resulting dataset contains detailed information about the financial position at household level and background variables of all – approximately 8 million – Dutch households.[6] As we observed households for up to 9 years, we were able to identify the changes in their savings over their time horizon. When the composition of a household changed, for example due to death, divorce, emigration or cohabitation, stopped monitoring the household, and when a new household was formed, we started monitoring the new household. All monetary variables were adjusted for inflation by multiplying them with the cumulative inflation compared to 2020 euros.

[6] Institutional households, student households, and households with unknown or negative income or savings were excluded.

Wealth buffers of investing and non-investing households

We divided our sample into households that never invested during the observed period (2011-2019), and households that invested in at least some of the years that we observed them. In addition, we computed a personal recommended wealth buffer for all households. This allowed us to distinguish between households that met the buffer criteria and those that did not. [7]

Approximately 11% of investing households (124,200 households) did not meet the personal recommended wealth buffer in 2019.[8] Table 1 gives a snapshot of investing and saving-only households in 2019, showing whether they satisfied the buffer criterion or not. The table shows that 3.1 million households that met the personal recommended wealth buffer criterion were not investing in 2019. Of these households, the majority (2.7 million) also did not invest at any other time in the 2011-2019 period.[9]

Table 1 Number of households who (do not) invest & (do not) exceed the personal recommended wealth buffer in 2019

	Number of households in 2019
Households that did not invest & did not satisfy buffer criteria in 2019	2 490 977
Households that did not invest & satisfied buffer criteria in 2019	3 099 542
Households that invested & did not satisfied buffer criteria in 2019	124 152
Households that invested & satisfied buffer criteria in 2019	987 448

The 3.1 million households that met the personal recommended wealth buffer criterion but were not investing in 2019 held significant wealth. The first part of Table 2 presents the observable household characteristics for this group in 2019 in the fourth column. From this, we observe that the median wealth is EUR 32,300. If we subtract the personal recommended wealth buffer, the amount to invest is EUR 20,300, implying a personal recommended buffer of EUR 12,000 (median). The second half of this table shows the characteristics of the main breadwinners. Most main breadwinners worked for an employer (52%). However, a substantial part was already entitled to retirement benefits (36%). Of the households that met the personal recommended wealth buffer but were not investing in 2019, around half of the breadwinners were aged over 60. This is also reflected in the average age of the main breadwinner (58 years in 2019). By comparison, we find that the main breadwinners of non-investing households that met the personal recommended wealth buffer in 2019 were older (36% versus 14% entitled to retirement benefits) and more often homeowners (64% versus 48%) than those of households that did not meet the recommended buffer requirements.[10]

The investing households that did not meet the personal recommended wealth buffer on average fell short by approximately EUR 8,800. Median wealth was found to be EUR 11,100, which is substantially lower than households that invested and met the buffer criteria (EUR 97,800). For this group, if we focus on the main characteristics of the main breadwinner, we find that a substantial share was self-employed (16%), their average age was 49, and they often owned the house they live in (82%). By comparison, the main breadwinner

[7] To be precise, the focus was on non-investing household who met the personal recommended wealth buffer for *at least* one period in the observation window. This led to approximately 5 million observations in our analysis sample. On average, a single household was observed for approximately 6 years.
[8] Note that for the households that invest, we also considered the value of their shares and bonds when determining if the households exceeded the Nibud buffer threshold. If we had only considered the balance of all savings accounts, approximately 25% of the investing households (in 2019) would not have met the recommended wealth buffer.
[9] For our main analysis, we included all non-investing households that satisfied the wealth buffer criteria at some point in time in the 2011-2019 period. But to facilitate interpretation of the data, here we present only those households that satisfied the criterion in 2019. As some of the households that did not invest in 2019 did invest at another point in time in the 2011-2019 period, we excluded them from our longitudinal analysis. However, we did include households which we did not observe in 2019 but observed in a different period.
[10] Even though these households did not meet their personal recommended wealth buffer in 2019, some of them might meet this criterion in a different observation year. If that is true, they were included in our analysis sample.

of investing households that met the recommended wealth buffer is less often self-employed (8% versus 16%), more often entitled to retirement benefits (31% versus 10%) and more often homeowner (87% versus 82%).

Table 2 Summary statistics in 2019 for investing households that did not meet the buffer requirement and non-investing households that met the buffer requirements. Because of rounding categories may not add up to 100%.

	Invested & met buffer criteria	Invested & did not meet buffer criteria	Saved & met buffer criteria	Saved & did not meet buffer criteria
Household characteristics (median)				
Current and savings account (including value of shares and bonds)	97,800	11,100	32,300	2,800
Amount to invest (current and savings account minus wealth buffer)	78,300	-8,800	20,300	-6,000
Household income after taxes	56,800	55,500	40,300	34,500
Main breadwinner characteristics (average)				
Birthyear	1960	1970	1961	1971
Job market status:				
Employed	52%	63%	52%	62%
Pensioner	31%	10%	36%	14%
On benefits	2%	3%	4%	13%
Self-employed	8%	16%	6%	9%
Other	7%	8%	2%	2%
household composition				
single without children	25%	27%	33%	40%
single with child(ren)	4%	7%	5%	11%
has partner without children	38%	26%	35%	21%
has partner with child(ren)	34%	40%	26%	28%
homeowner	87%	82%	64%	48%
Observations in 2019	987 448	124 152	3 099 542	2 490 977

Note: current and savings account, amount to invest and household income after taxes in euros and rounded to nearest hundred.

Methodology to compute investment returns

For each year, we observed the amount of euros by which the savings balance had increased or decreased, i.e., the 'net changes' on saving and debit accounts. We used this to determine if households could still make these changes in the counterfactual world if they incurred (simulated) investment losses.

We generated a counterfactual scenario by having non-investing households (fictitiously) invest a share of their savings in an index fund over the observed period. We did not let households invest all the savings they had available in current and savings accounts.[11] Instead, we requires them to keep a buffer. This buffer equals the Nibud buffer for employees and a buffer equal to the Nibud buffer plus three months of net income for the self-employed and deduct potential outstanding consumer credit. The remainder was invested in the index fund. For example, a non-investing household with EUR 10,000 in savings and a Nibud buffer of EUR 3,000 would invest EUR 7,000 in our counterfactual scenario. Note that in this study, we did not apply life cycle investing or consumption strategies (that maximise expected utility). We simulated investment returns rather than relying on actual investment returns to compute the more generalisable expected return, its variation and the associated risk. If at any given year the household no longer met the buffer criteria, we set investments to zero but kept these households in our sample to avoid selection bias.

To simulate the returns on the fictitiously invested assets, we used a Geometric Brownian motion. This Geometric Brownian motion is driven by two parameters: drift and volatility, where drift is the average annual percentual increase and the volatility is the fluctuating around this drift.[12] The drift was estimated to be 0.0246% and the volatility 0.8552% per day implying an average annual gross return of 7,4% and a Sharpe ratio of 0.55.[13] The estimated annual return and volatility is similar to the gross annual return of the MSCI world (EUR) (6,97, Sharpe ratio = 0.44) and the MSCI ACWI (EUR) with gross annual return of 6.93, Sharpe ratio = 0.44, both estimated using data since 1998. Using these parameters, we simulated 1,000 paths of 9 yearly returns, so in total 9,000 returns. The simulated distribution of returns can be found in the Figures 1 and 2. The average yearly investment returns amounted to 7,4%%, but in the worst scenario a household lost up to 30% of their investment in a given year. If an individual invested the full nine years, investment returns amounted to 89% on average and the household could lose up to 61% of their investment in the worst-case scenario (excluding costs). With this approach we aim for a reasonable indication of potential investment returns and associated risks. However, this should not be considered a precise estimate. The approach is based on a simplified world where we do not take into account the correlations between saving rates, the correlation between consumption and income pattern and stock returns or other more complex dynamics in stock returns.

[11] We adjusted for earned savings returns (interest income) because these were not present in the counterfactual scenario in which people invest. We assumed that people do not make a return on the part of the savings that was not invested in the counterfactual scenario. This is consistent with a low interest rate environment and a situation where the money is held in a checking account. This provides a slightly lower return in the counterfactual situation of investing than would be the case in real world.

[12] Parameters were estimated using the daily MSCI world price returns, in USD, from 1 January 1970 until 21 September 2020, extracted from the Bloomberg terminal on 22 September 2020 (990100 MXWO index). We had 252 trading days per year.

[13] The drift was estimated by taking the average of the daily log-returns, where the volatility was estimated by calculating the scaled sample variance of the log returns.

Figure 1 - Simulated distribution of yearly investment returns

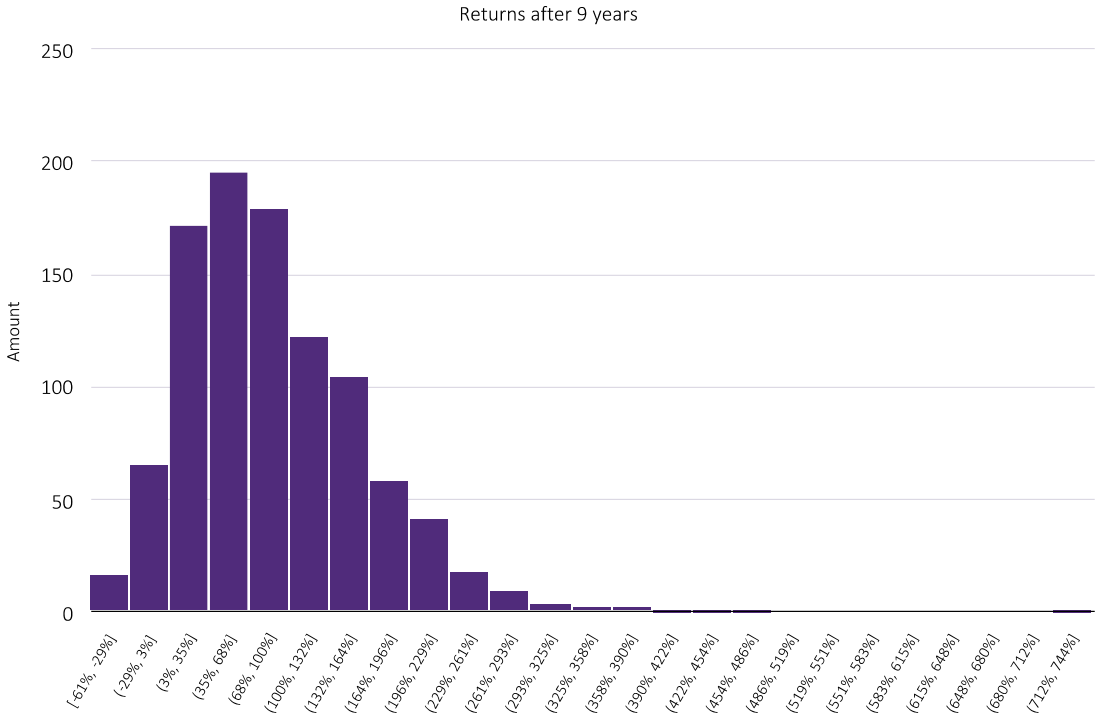


Figure 2 - Simulated distribution of investment returns after 9 years

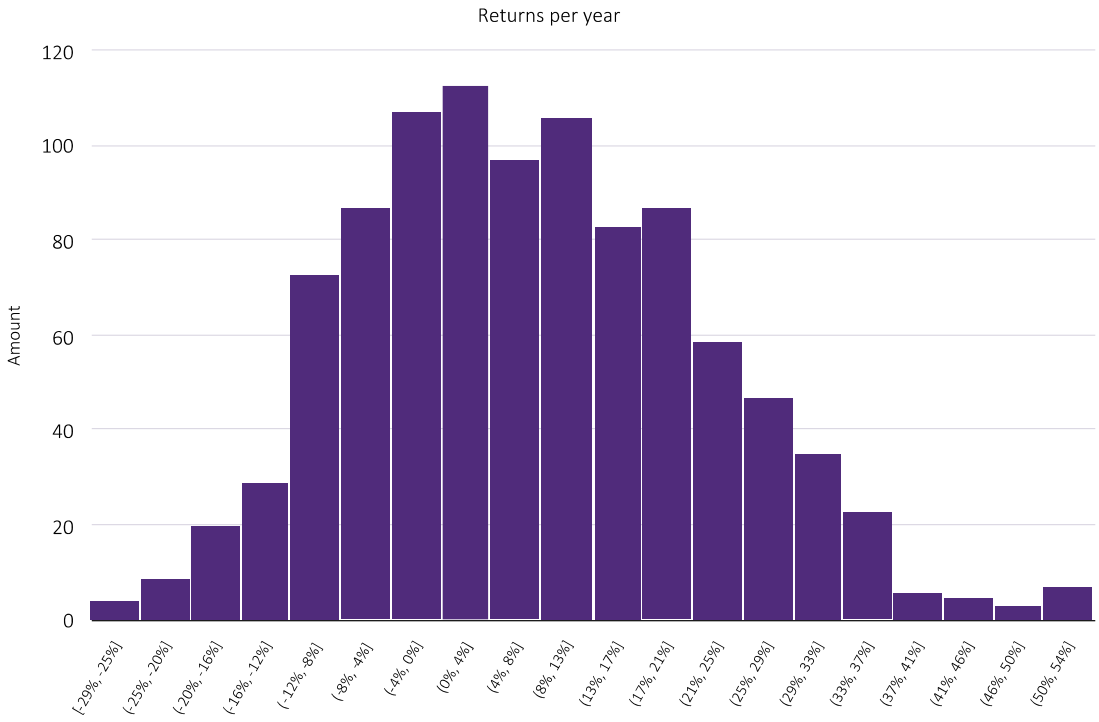
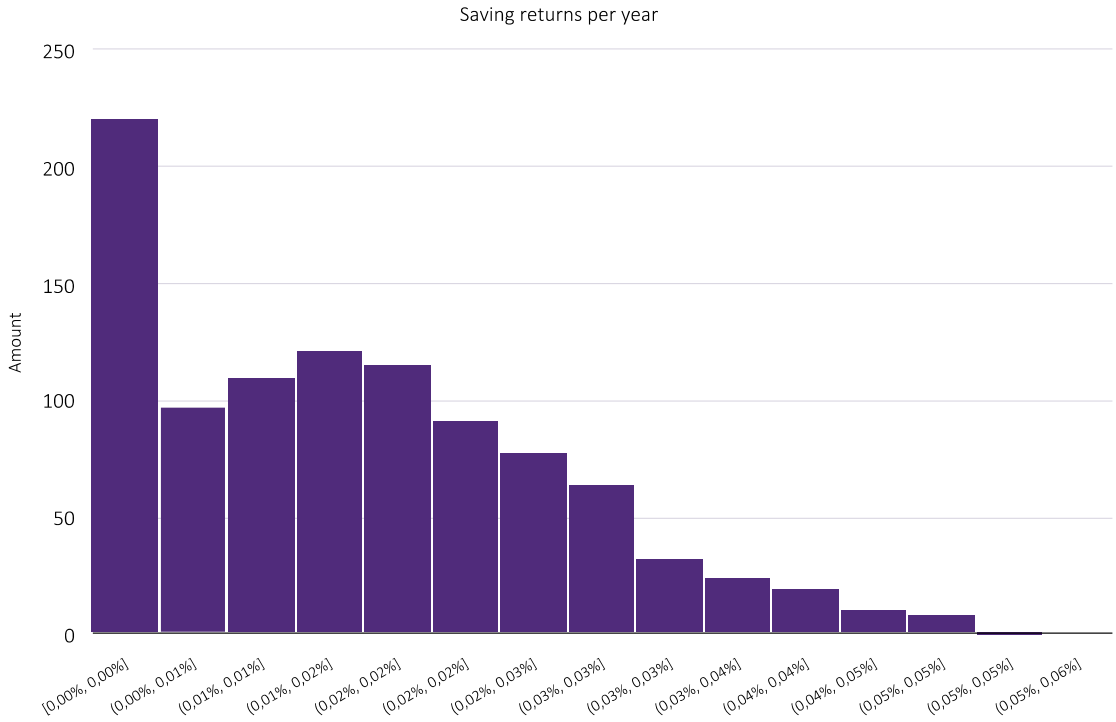


Figure 3 - Simulated distribution of yearly savings returns

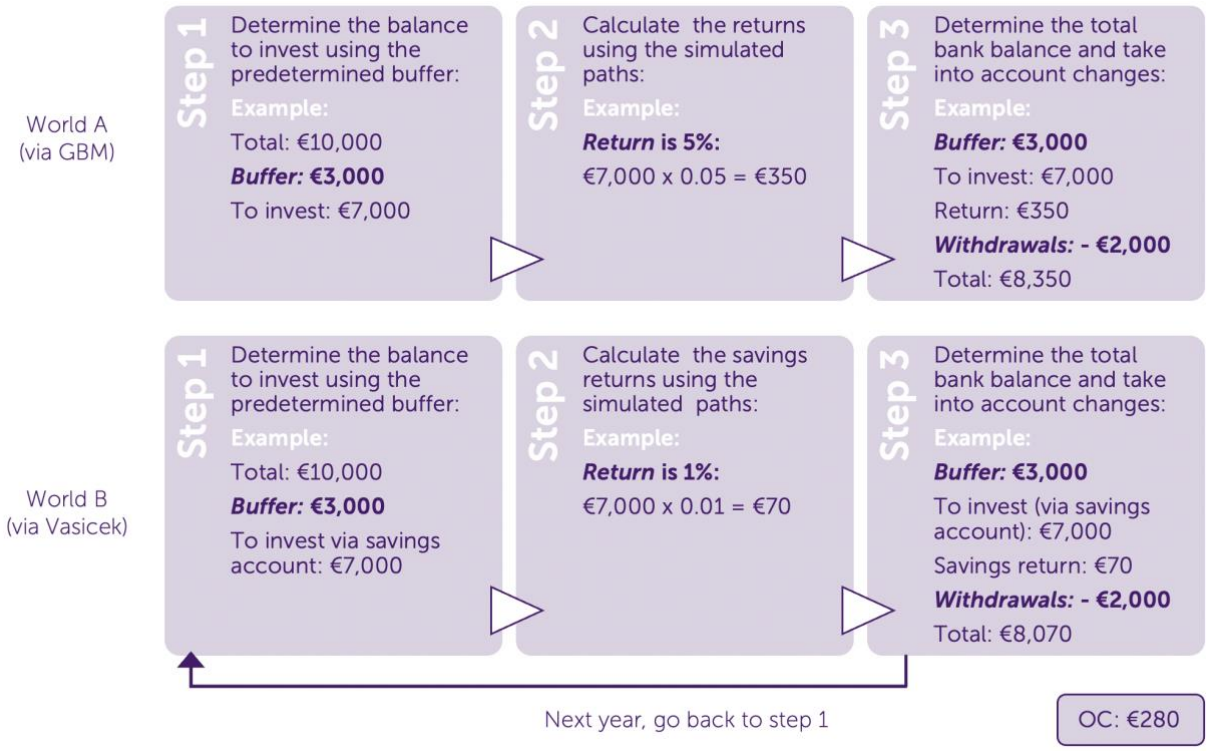


To obtain the opportunity costs, which are the returns of investing minus the returns of saving, we also simulated savings returns using a modified Vasicek model. We used interest rate data from the Dutch Central Bank (DNB) to estimate the parameters for the Vasicek model using OLS.[14] The modification is the assumption that negative interest rates are not charged to customers which means that negative interest rates are set to zero after the simulation. We obtained the opportunity costs by taking the difference between the simulated world where we invested savings using GBM and the simulated world where we had savings developed through Vasicek. The simulated distribution of savings returns can be found in Figure 3 above. The average interest rate was 0.01%. Throughout this paper, we abstain from the effects of taxation of savings, or potential correlation of interest rates with investment returns.

To research the impact of the costs of investing, we examined the impact of yearly costs of 0.6% of the investment input. This is consistent with approximately 0.4% instrument costs and 0.2% service costs and is in line with costs that are typically charged in the Netherlands[15]. The final returns estimated by the GBM decreased by 0.6% when costs were included. If, for instance, a household invested EUR 100 with a return of 5%, their assets increased to EUR 105. The costs were EUR 0.60. Therefore, the total return was EUR 4.40, corresponding to return of 5% minus 0.6%, so 4.4%. Because of the effect of compound returns, the total effect on returns is higher. We did not include transaction costs, but because the simulated passive approach assumed only one buying and selling moment a year, this would have had a relatively small effect on net returns.

[14] The input used for estimating the parameters was the interest rate on deposits without a notice period in the period from January 2003 until November 2020, downloaded from the DNB website on 12 January 2021. This was done because additional data was not available and using more data would not necessarily have improved the model because of the mean reverting nature of the Vasicek model. The parameters were the maximum likelihood estimators.
[15] While we calculated with a comparably low percentage of 0.6% costs and charges for investors in the Netherland due to the Dutch ban on inducements, the European average for costs and charges is between 1.0-2.2% in total fees, depending on the provider and country of registration

Figure 4 - Schematic overview of the counterfactual scenario for a single year. The figure shows how the opportunity costs of saving instead of investing of EUR 280 are derived.



Results: The Potential Rewards of Index Investment

If the households that are currently saving and have sufficient buffer would invest in a passive index fund, it could provide them with additional wealth. When we follow households over time and let them invest the wealth above their personal wealth buffer, and not invest when they do not have sufficient buffer, the expected (median)[16] return is EUR 895 (gross, excluding transaction costs) per year (Figure 5). If we include investment costs of 0.6% this reduces to EUR 810. If we use a structural interest rate of 2% instead of the simulated interest rates we derive yearly gross opportunity costs of EUR 680, for a structural interest rate of 4% this reduces to EUR 450. The variation between expected return between households depends on the amount that can be invested. The amount that can be invested is higher for wealthier households and households with lower required buffers. In the period we observed, investing yielded more than saving in almost 80% of the cases (Figure 7) when costs are excluded. When taking into account 0.6% investment costs this decreased to 77%. This percentage will increase for longer horizons because of compound returns. The average total opportunity costs (median) was EUR 3,931 excluding investments costs and EUR 3,580 including costs (Figure 8), but because we only observed households for a limited horizon this number is less informative. Expressed relative to income, the expected yearly return of index investment over saving was about 30% of one month income (Figure 6).

[16] To be precise, we calculated the average opportunity costs over all thousand simulations per household. Next, we considered the median (p50%) OC for all households. In the main body of this study, we refer to this as 'expectation (median)'. In the figures below, the 25% and 75% percentiles show the variation between households.

Figure 5 - Average annual opportunity costs, median EUR 895 without costs and median EUR 810 with 0.6% costs.

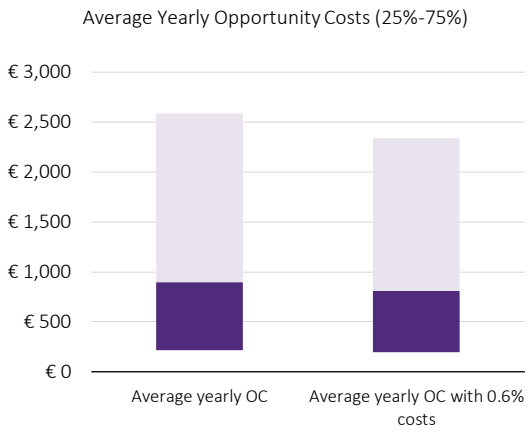


Figure 6 - Average annual opportunity costs as % of monthly income, median 30% of monthly income

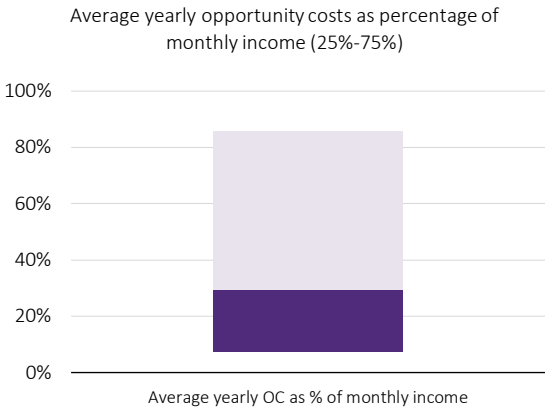


Figure 7 - Probability that investing returns exceed saving returns, with and without 0.6% costs.

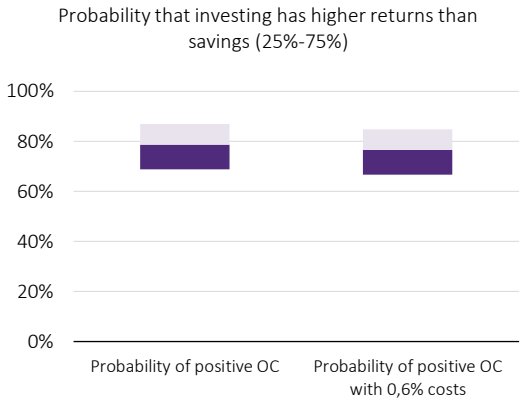
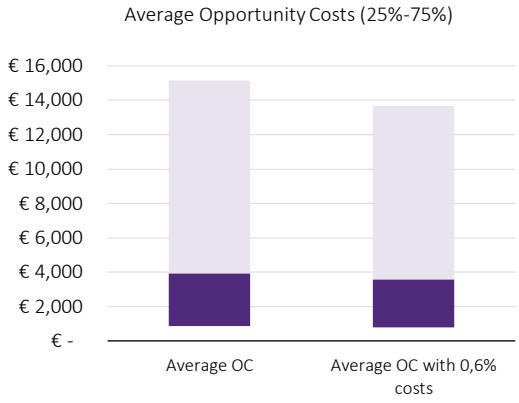


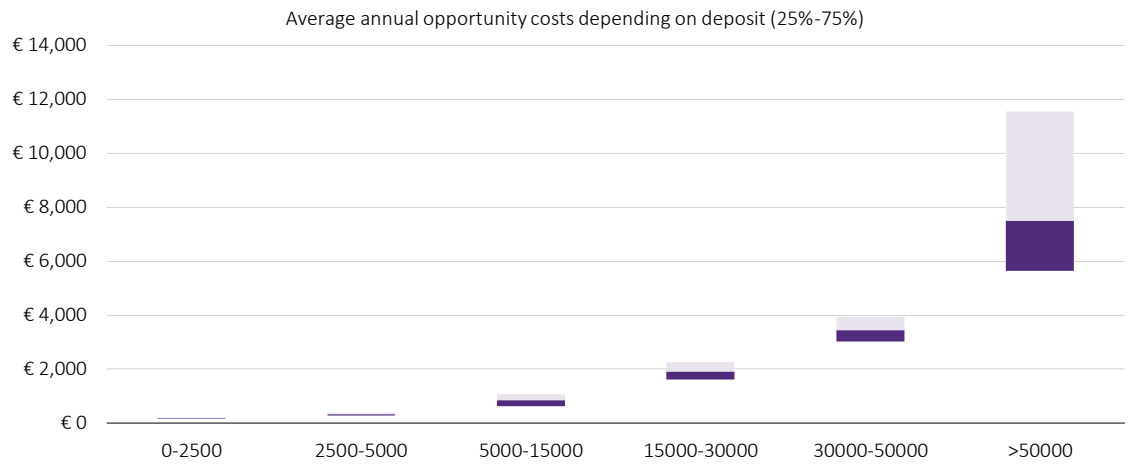
Figure 8 - Total average opportunity cost, median EUR 3,931 without costs and EUR 3580 with 0.6% costs.



The size of the potential reward strongly depends on the amount of capital being invested. For households with EUR 5,000-15,000 in assets to invest, the amount was EUR 850 (gross) annually and for households with EUR 15,000-30,000 in assets, the amount was around EUR 1,900 (gross) per year. For the category with EUR 2,500-5,000, this amounted to around EUR 350 (gross). When we excluded households that could annually *invest* an average amount of less than EUR 5,000[17] the expected yearly opportunity cost (median) in the population increased from EUR 895 to EUR 2,060 (gross), but the number of potential investors decreased by 40%.

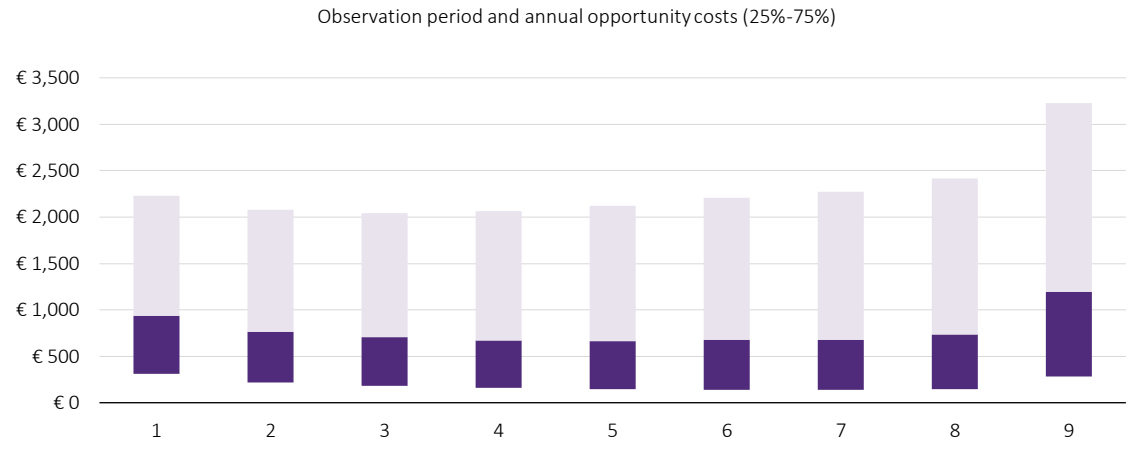
[17] We selected households for which, a priori, the yearly average amount to invest is was least EUR 5,000 during the observation window.

Figure 9 - Average annual opportunity cost by deposit (gross)



The annual opportunity cost varies over the length of the investment period. The effect of compound returns ensures higher expected returns over a longer investment period. In our sample, household characteristics differed across the observed period. For example, households with the longest observed period of 9 years were wealthier on average and therefore had more money to invest. This caused other differences in the relation between observation period and opportunity costs than we would see solely based on a compound returns effect. This is also reflected in Figure 10 below, which shows an upward trend because of a compound returns effect, but also shows that the average annual expected return is disproportionally higher for households that were observed for the full period of 9 years and households that were observed for only one year. This is due to both their construction and selection effects.[18] Because of the compound return effect and the differences in characteristics across the observed period, presenting the opportunity costs of households that have been in our sample for the full 9 years would give a distorted picture. We thus focused on the average annual opportunity costs of households over the observed period, as this gives a more representative picture of the revenues that households can expect on average.

Figure 10 - Observation period (years) and opportunity costs (gross)

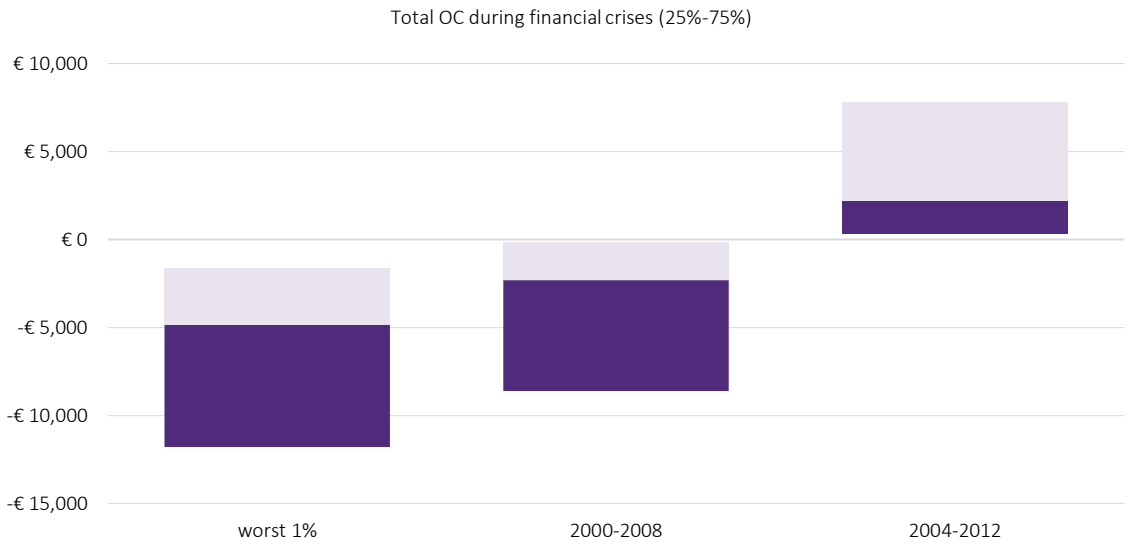


[18] Households for which we calculated the opportunity costs were required to meet the personal recommended wealth buffer at least one year in the observation window. If we observed a household for multiple years, this implies that in some of these years the household may not have met the personal recommended wealth buffer, depressing average opportunity costs. However, if we observed a household for only one year, by construction this household meets (and exceed) the personal recommended wealth buffer. Thus, the amount to invest was positive. Since, on average, returns were positive, these households had higher opportunity costs compared to households that we observed multiple years – except for households that were in our sample for the full 9 years.

Results: The Risks of Index Investing

In bad stock market years[19] there can be significant losses for households. When looking at aggregated total opportunity costs over the observed period, the average losses amount to around EUR 4,900 (gross) for each household's worst 1% of investment returns[20]. This increased to EUR 5,100 when we included 0.6% investment costs. When we simulated the returns for the period during which both the dot-com bubble and the credit crisis took place (2000-2008), relying on MSCI world data, or the period during which the credit crisis took place (2004-2012), the results were less severe. For the 2000-2008 period, the median loss over the observed period was EUR -2,300. The variation in returns is explained by the timing and the amount of euros invested. In the period around the credit crisis (2004-2012), opportunity costs were still positive and households earned EUR 2,200 (median) more by investing than by saving.

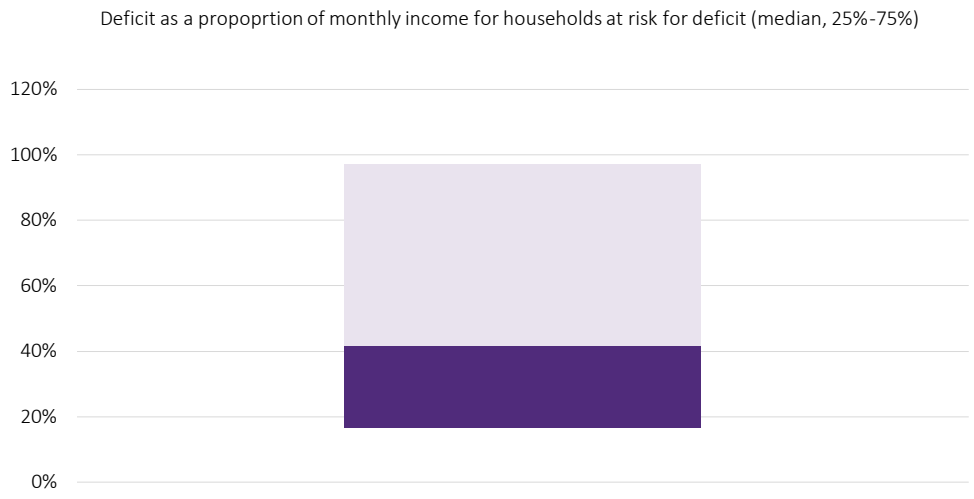
Figure 11 - Total opportunity costs (gross) during bad stock market years. Worst 1%, median - EUR 4,900. 2000-2008, median - EUR 2,300. 2004-2012, median EUR 2,200.



Sometimes households are no longer able to spend as they originally did due to disappointing results. Non-investing households with savings in excess of the wealth buffer *generally* were able to continue to maintain their original spending pattern if we let them invest and incur losses. Overall, the probability that households would no longer be able to make their desired expenditure was 0.2% (when excluding costs) per year. This percentage was the same during the financial crisis period of 2000-2008. When households were at risk of no longer being able to make their observed change, and thus no longer able to spend as they did when they were only saving, the deficit generally amounted to around 0.4 monthly income (median) as is shown in Figure 12 below.

[19] Bad stock market years were considered by using historical returns from specific periods (2000-2008 and 2004-2012) in our counterfactual world that contains households from 2011-2019. For example, a household that we observed starting from 2012 was mapped to returns starting from 2001 (2005).
[20] The worst 1% of outcomes was the 1% smallest outcome of the simulation result per household.

Figure 12 - Total deficit in the observed period as a proportion of monthly income for households at risk. 'At risk' was defined as at least one (1 out of 1,000) simulation paths where the household would no longer be able to make a change, excluding costs.



For households whose main breadwinner was a pensioner and for couples without children, we found a relatively high probability that they would no longer be able to afford their original spending pattern when we let them invest. We compared the household characteristics of those with a greater and smaller than 5% annual probability of no longer being able to afford their original spending pattern. As a result, we found household with less savings relative to their expenditure and those with greater fluctuation in their expenses over time were more likely to be unable to afford their original spending pattern. For households that make a big purchase, such as a car or a house, there may be a greater likelihood of a mismatch due to poor investment returns.

Table 3 - Household characteristics of households in 2019 and probability of no longer being able to make a change

		>5% probability of inability to maintain spending pattern*	**<5% probability of inability to maintain spending pattern**
Main breadwinner characteristics Variable		Mean	Mean
	Birthyear	1956	1962
	Savings without interest income, adjusted for inflation	35,200	48,200
	Other debts	10,000	5,000
	Amount to invest	28,200	39,300
	Net yearly income, adjusted for inflation	44,100	45,300

Job market status	Employed	39%	53%
	Other	3%	2%
	Pensioner	46%	35%
	On benefits	6%	5%
	Self-employed	7%	5%
Household composition	Single	32%	35%
	Single with child(ren)	3%	5%
	Couple	43%	34%
	Couple with child(ren)	23%	25%
Homeowner	No	39%	38%
	Yes	61%	62%

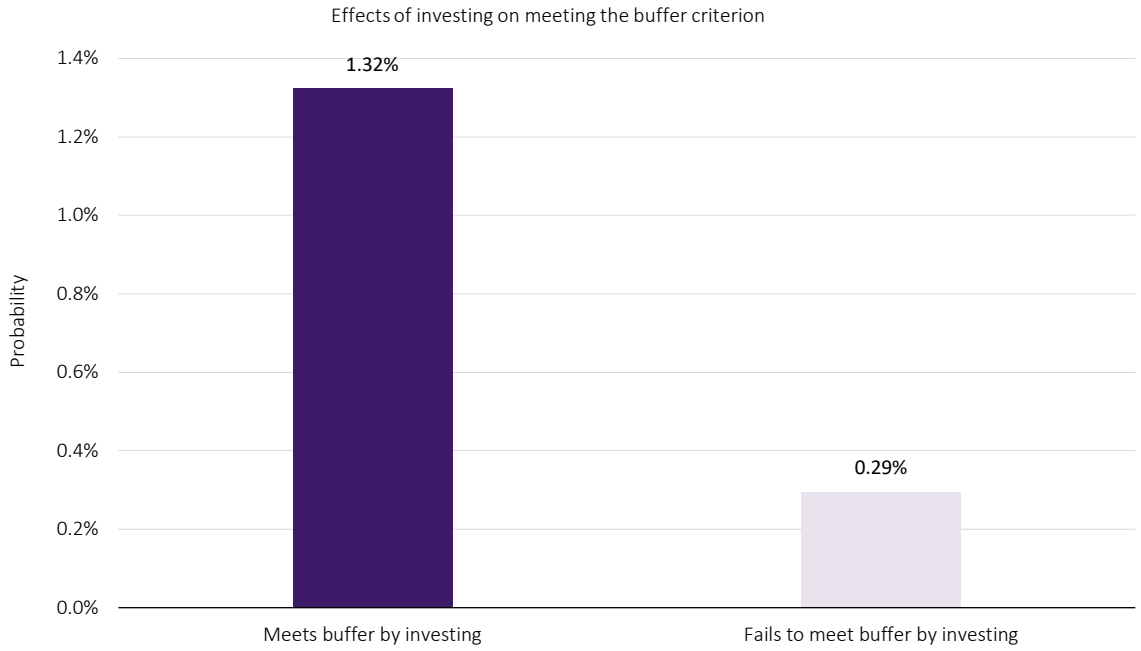
* This probability refers to annual probability of not being able to afford a change in the observed liquid wealth and is computed by taking total probability for each household and dividing by the observation period for that household.

Results: financial Resilience due to Index Investing

For most households, investment returns did not affect the probability of meeting the buffer criterion. Whether a household met its buffer criterion and was thus considered financially resilient varied per year. There where households that failed to meet the buffer criterion in some of the years (we defined such failure as feeling to meet the criterion in at least one year) but were able to reach it when they invested. For most households (around 98%), investing did not change *whether* they met their buffer criterion, but it obviously changed the *amount* of their buffer. For some households investing improved their chances of meeting the buffer criterion. We computed that on average 1.32% of households would be able to meet the buffer through investments, corresponding to 41,000 households in 2019.[21] By contrast, some households would no longer meet the buffer criterion due to investing, but this percentage was considerably lower (<0.3%), corresponding to 9,100 households in 2019.

[21] These numbers of households were estimated by multiplying the expected annual probability of meeting (or not meeting) the buffer by the total number of households in 2019.

Figure 13 - Probability of meeting the buffer by investing as compared to the probability of not meeting the buffer by investing



Conclusion

In the current situation of low returns on savings and accessible forms of retail investment, the number of Dutch households investing has grown. At the same time, we observed that many households that put their savings in bank deposits at low yield. This study analysed the financial consequences of the decision by households to save instead of invest.

In 2019 a group of 1.1 million households invested in the stock market. Around 11% of these households did not meet their personal wealth buffer, meaning that they may not have had sufficient funds to absorb unexpected losses. These investors were more often self-employed and therefore inherently exposed to more income volatility.

At the same time, we found that there was a group of over 5 million Dutch households that did not invest in 2019. Roughly 3.1 million households in that group met and even exceed their recommended wealth buffer. When we created an 'alternative universe' where households were to invest the amount in excess of the personal recommended wealth buffer in a passive index fund, we found that they were able to accumulate significant wealth. On average, this strategy yielded EUR 895 per year (gross and excluding investment costs) more than they would have earned by saving during the period that we observed. When we included 0.6% investment costs, this average return decreased by EUR 65 to EUR 830. For households able to invest more than EUR 5,000, the average return was EUR 2,060.

We relied on historical data to estimate the parameters used for our simulations. If structural changes were to take place in the economic environment, for example if we were to enter a world with structurally higher interest rates than observed in the past decade, this would also affect the opportunity costs of investment. For instance, we calculated that if the interest rate were to increase to 2% (4%) on a long-term basis the yearly gross opportunity costs would be EUR 680 (EUR 450) instead of EUR 895.

If households decide to invest, they will also face risks. When stock market returns are low, investing can cause households to be significantly worse off than they would have been if they had put their savings in a savings account. The aggregate losses that households will incur during the period that they are investing in our simulation (up to 9 years) will amount to about EUR 4,900 gross in the 1% worst scenarios and EUR 5,100 when including 0.6% investment costs. Bad returns can also cause households to no longer be able to make purchases that they originally would be able to make, or to no longer meet the buffer criterion to absorb unexpected losses. This analysis shows that this probability is relatively small (<0.3%) for the index investment scenario that we studied. Risks are mitigated because the losses associated with index investment are relatively limited and because we only let households invest the amount in excess of their personal recommended wealth buffer.

The results of this study only apply to the specific passive investment strategy of purchasing a low-cost index fund that we studied. They do not translate to other investment strategies, such as those that involve active trading, high transaction costs, non-diversified portfolios, and complex or more risky products. The scientific literature shows that many retail investors in the execution only channel do not invest in well-diversified portfolios, trade too often, and receive subpar returns after subtracting costs. Future research could give more insight into how investor performance differs from the passive index investment approach applied in this study and could see how investor behaviour is affected by the decision-making environment.

In this study we took expenditures as given and used a simplified investment heuristic where we invested all funds in excess of the personal wealth buffer in index funds. This approach allowed us to attain a reasonable upper bound of what returns are available through index investment but differs from a normative model that considers aspects such as risk appetite, age, and individual optimisation of consumption patterns. The assumed behaviour therefore does not correspond to what an optimising rational agent would do. It is left for future research to explore the use of more sophisticated heuristics that may give clearer insight into the implications for individual well-being Future research may also aim for a more precise estimate of risks and rewards by more precisely modelling index returns, for example by taking into account the effect of correlation between stock returns, interest rates, consumption and income patterns.

Investors who want to invest, whether independently or with assistance, should first check whether they have a sufficient buffer to absorb setbacks. They should also ask themselves whether they are prepared to accept the risks associated with investing. The decision whether to invest in the stock market will always be a personal one that depends on one's financial goals, risk appetite, financial situation, and alternative investment opportunities. According to the scientific literature, retail investors should invest in a well-diversified, low-cost portfolio, such as a passive index fund, to avoid common investor mistakes. Financial service providers can support households in this by making it as easy as possible to choose a sensible investment strategy. Offering products that suit the target group, a carefully designed decision-making environment and customer-friendly information can contribute to this.

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Appendices

The Effects of Investment Strategy on Opportunity Cost and Risk Exposure

The applied investment heuristic affects opportunity costs and risk exposure. Here we compared the effects of four different investment heuristics.

1. No asset threshold. With this heuristic, we allowed households to invest all their savings. We excluded institutionalised households, student households and households with unknown or negative income or assets.

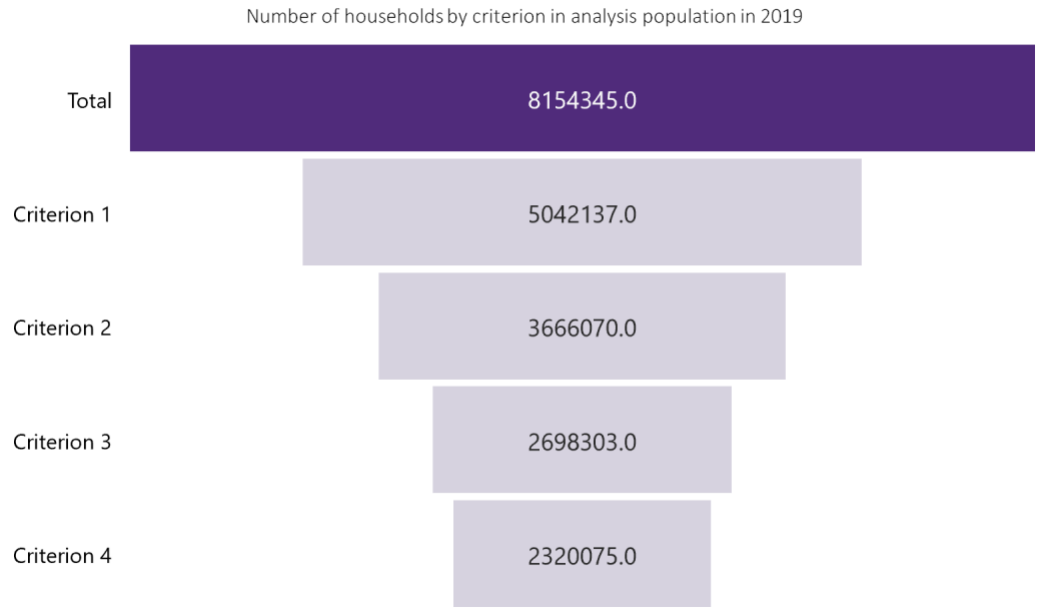
2. Income buffer only. With this heuristic, we allowed households to invest their savings in excess of one net monthly income (net of any potential outstanding consumer credit)

3. Recommended wealth buffer. With this heuristic, we allowed households to invest their savings in excess of the recommended wealth buffer that is used in this study, a buffer equal to the Nibud buffer or a net monthly income, whichever is higher. Self-employed workers could invest their savings in excess of the Nibud buffer plus 3 months of net income.

4. Income + expenditure buffer. With this heuristic, we allowed households to invest their savings in excess of a buffer that is equal to one net monthly income plus the Nibud buffer for employees and 3 net monthly incomes, plus the Nibud buffer for self-employed persons.

The figure below depicts the number of households that satisfied these 4 buffer criteria in 2019 and that were included in our simulations. Note that these numbers differ from the number of households that were not investing in 2019, presented in Table 1 in the main text. The analysis sample includes only households that *never* invested in the observed period.

Figure 16 - Households in sample in year 2019. Note that these numbers differ from the number of households that were not investing in 2019, presented in Table 1 in the main text. The analysis sample includes only households that never invested in the observed period.



Differences in opportunity costs and risk exposure are partly due to an asset threshold effect and partly due to an asset allocation effect. The four different heuristics that we looked at set requirements for both the share of assets that can be invested and the minimum assets that a household must have before this household can invest. Criterion 4 sets higher requirements for wealth than Criterion 1, so in Criterion 4 people will be richer on average than in Criterion 1. The wealth allocation also differed between the scenarios, Criterion 4 invests a lower share of the wealth than Criterion 1. These effects can have an opposite effect on opportunity costs, which can be clearly seen in the figure below, in the left panel, in which households that satisfied Criterion 1 had lower opportunity costs than households that satisfied Criterion 4 despite being allowed to invest a larger share of their savings. The panel on the right shows that the risks of not being able to make a transaction decreased for the stricter criteria, in this case the asset threshold effect and the asset allocation effect work together. Buffer criteria protect in two ways: due to the selection effect (they are wealthier households) and due to the asset allocation effect implied by the buffer criterion (less capital in shares).

Figure 1 Annual chance of not being able to afford original expenditure pattern, by criterion

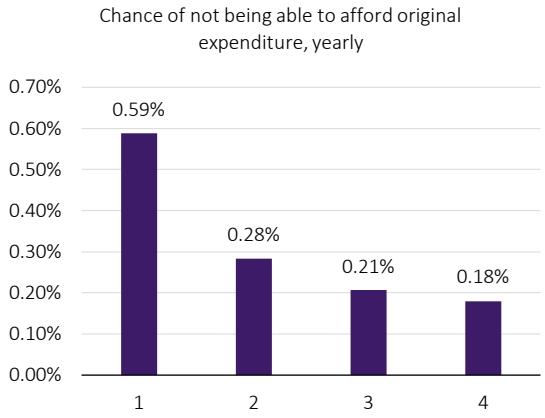
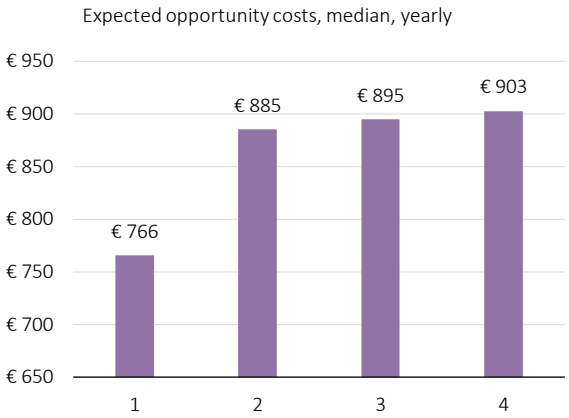


Figure 2 Expected annual opportunity costs by criterion



Buffer criteria protect against risks but are costly for wealthy households. The different buffer criteria influence who can invest (assets at least equal to the buffer criterion) and how much can be invested (households do not invest their buffer). Figures 19 and 20 below depict the effects of changing buffer criterion on both opportunity cost and the risk of no longer being able to fund expenditures while holding the population of households constant. For example, it shows what are the opportunity costs if the population that satisfies the buffer criterion 2 invests as in buffer criterion 1 (invests all funds). This allows us to compute the costs and rewards of selecting a stricter buffer criterion. The stricter asset allocation effect has a price, it costs more than EUR 800 per year (excluding investment costs) for households meeting the criteria of buffer criterion 4 not to invest as in buffer criterion 2 (Figure 19). Instead of earning an average of 1700, they earn about 900 annually. On the other hand, there is a protection against budget problems, the risk of no longer being able to make the transactions that they could make when they were saving, reduces from 0.27% to 0.18% (Figure 20).

Figure 19 - Effect of criteria on annual opportunity costs

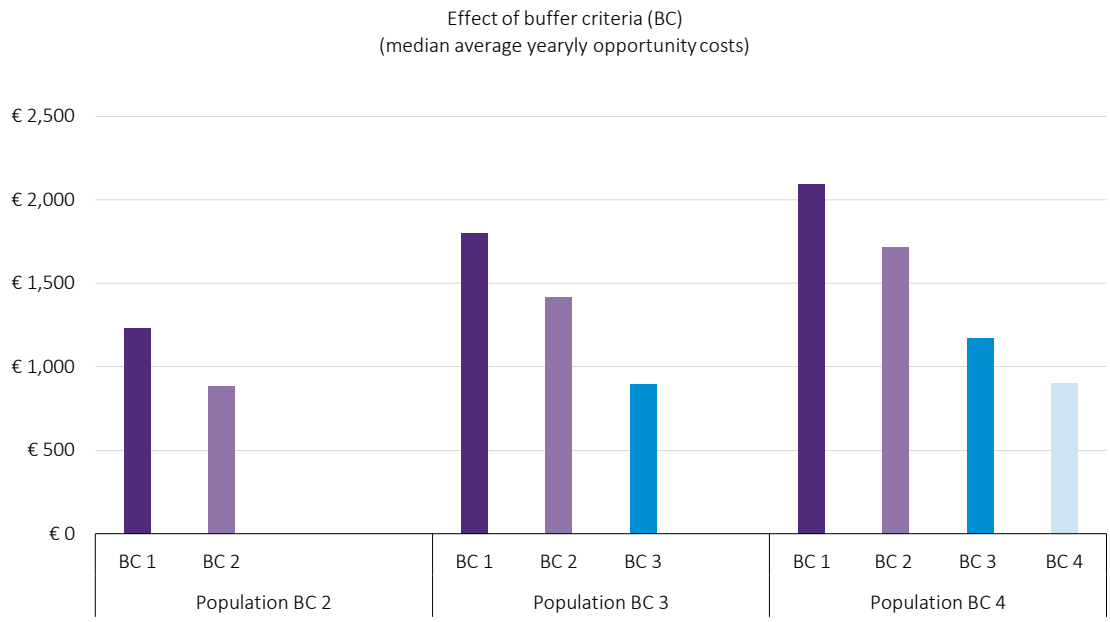
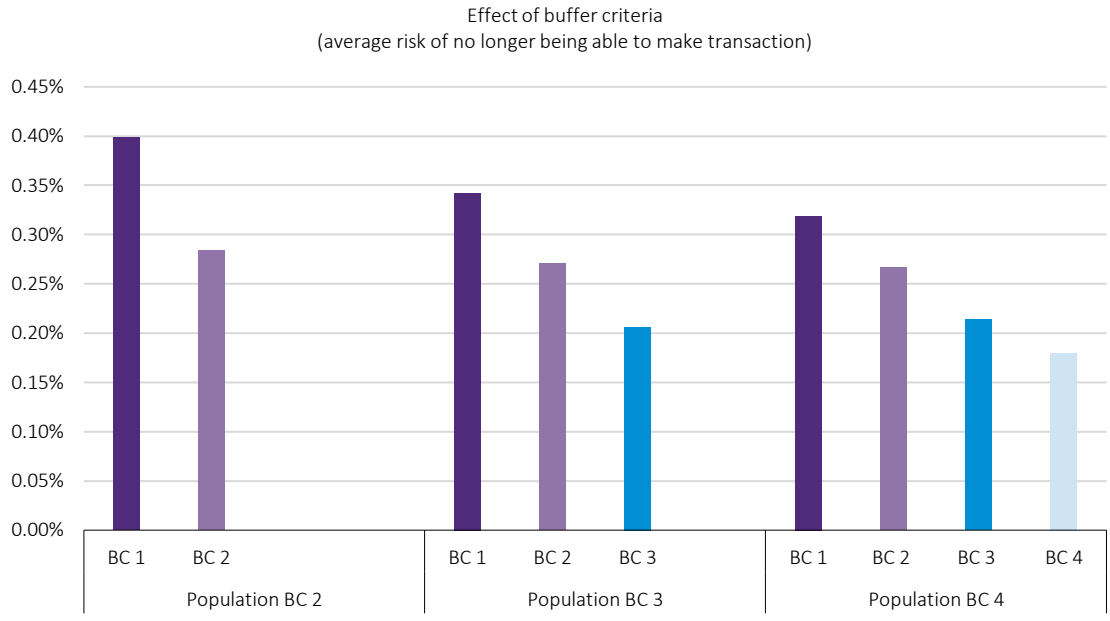
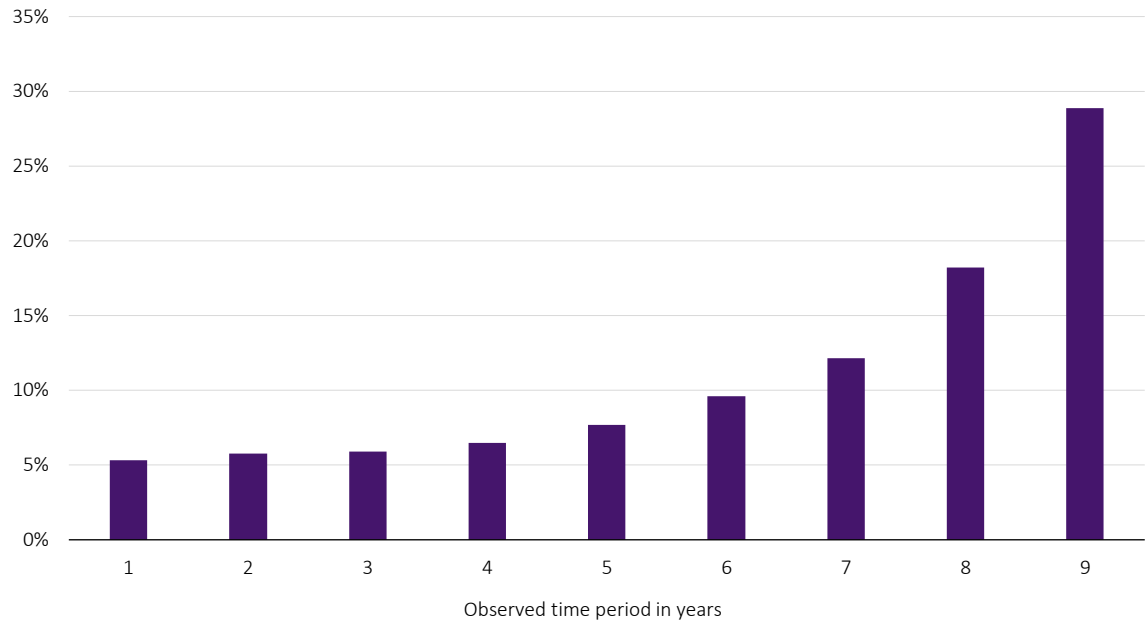


Figure 20 - Effect of criteria on average risk of no longer being able to make transaction



Figures and Tables

Figure 21 - Distribution of households over observed time period



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