

Equity Premium Puzzle, Expectations and Covid-19: Evidence from Germany

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Abstract

What differentiates households who invest in financial assets from those who do not? I ask respondents directly using the Bundesbank Online Pilot Survey on Consumer Expectations in Germany about the reasons for their investment decisions during the Covid-19 pandemic. I find that lack of information and interest are the biggest determinants for non-participation, while risk and time constraints prevent households to re-balance. Buyers invest either because of expected increasing asset prices or due to a (pre-existing) savings plan. Additionally, I find that households who have higher expectations of property prices as well as inflation are less likely to buy financial assets.

Keywords equity premium puzzle - participation cost - adjustment costs - expectations - Covid-19

JEL codes D14, G11, G5

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1 Introduction

The equity premium puzzle documents the small number of financial asset holders given the excess return these assets yield. While this is not a new phenomenon, the literature is still growing. Household finance papers have tested empirically a variety of factors why households do not hold stocks at all and if they do, why the fraction of their portfolio is so small. These mechanisms are usually tested individually using different time periods, locations, and reference groups which makes a comparison almost impossible.

A comparison gets even harder when multiple circumstances change simultaneously. The Covid-19 pandemic offers such a period where stock markets fell dramatically and recovered vastly. Additionally, restrictions altered work, consumption, and leisure patterns.

To overcome this identification problem, I ask households directly about their financial asset investments they made during the first six months of the pandemic and the factors that led to their decision. Using novel data from the Bundesbank Online Panel (BOP) allows me to distinguish between non-participants, households who did not adjust their portfolio, as well as buyers and sellers. Each type ranks various reasons brought forward in the literature from very important to not important at all. Hence, I can assess which factors were more or less important and how they relate to each other. Additionally, the survey includes various questions on household expectations. Hence, I can analyze how they affect financial behavior.

This paper contributes to three gaps in the literature. First, it compares magnitudes or importance of participation costs. Here, it is close to [Choi and Robertson \(2020\)](#) who ask in 2016 around 1,000 household heads what determines their portfolio equity share. One important difference to this paper is that while they ask for general factors, I focus on reasons concerning a fixed 6 months period which makes it more concrete and therefore more accessible to answer in a survey setting.

Second, adjustment costs which need to be paid when changing the portfolio are crucial when matching shares invested in equity markets. Papers such as [Giglio, Maggiori, Stroebel, and Utkus \(2019\)](#) advocate for a fixed exogenous proportion of households who re-balance each period. Alternatively, [Bonaparte, Cooper, and Zhu \(2012\)](#) model them as a proportion of income. Nevertheless, there is no clear structural model nor convincing empirical evidence explaining what these adjustment costs consist of. My survey questions allow me to ask households explicitly what prevents them from adjusting and what makes them decide to buy or sell.

Third, the literature connecting financial asset decisions and expectations focus on expected stock market returns and equity investments. For example, [Arrondel, Calvo Pardo, and Tas \(2014\)](#) find that participation increases monotonically with stock market expectations and [Choi and Robertson \(2020\)](#) show that expected higher returns are very or extremely important by a quarter of all stock market participants. Additionally, [Giglio, Maggiori, Stroebel, and Utkus \(2019\)](#) find empirical evidence for wealthy retail investors. In contrast to the literature, I shift attention towards inflation and house prices whose influence on financial asset decisions is more explorative.

My findings are that lack of information and lack of interest are the most important

factors why households do not participate in financial markets. Reasons can be grouped into risk aversion, lack of resources, and savings, whereas the first two have a life-cycle and the latter an income component. Second, households did not adjust their existing portfolio either because they thought it is a bad timing or due to time constraints. Third, households invested either because they expected higher stock market prices - which is related to other factors such as time, information, and peer effect - or due to a (pre-existing) savings plan. Additionally, households are more likely to invest in assets they're already holding. Fourth, some households sold to re-balance or prevent further losses. Finally, households are less likely to buy financial assets if their expectations of house prices as well as inflation is higher.

The year 2020 is an interesting time period to study. Due to Covid-19 and corresponding restrictions in March 2020, the German stock market (DAX) plummeted by almost 40%, but recovered vastly and finished with a yearly return of 3.5%. Nevertheless, the overall participation rate increased by 2.7 million. The DAI (2021) reports that the biggest increase (40%) was made for Germans younger than 40.

Economic theory gives many explanations how this period could have impacted financial investment decisions. On the one hand, the bufferstock model by Carroll and Toche (2009) suggests that higher income uncertainty increases the target level of wealth to dampen possible shocks. Additionally, a bust is usually followed by a recovery which marks a good opportunity to start investing. Hence, households with more optimistic views should invest. Lastly, Covid-19 affected everyday life in many dimensions. Consumption restrictions could have increased savings and free time for some households which could be used to organize personal finances.

On the other hand, multiple paper provide evidence why stock market participation should fall after Covid-19. Malmendier and Nagel (2011) would argue that the vast decline in stock prices scares people away. This should affect especially younger households who put more emphasis on recent periods when making financial asset decisions. Additionally, the path of recovery contains a lot of uncertainty as it depends on behavior of others and government, vaccination availability and efficacy, as well as possible mutations. All these risk assessments are reflected in the stock market, hence, workhorse models such as Capital Asset Pricing Models (CAPM) suggest that people would reduce their asset holdings. Lastly, working remotely and home schooling urged households to additional consumption (e.g digital infrastructure) and marked a huge burden especially on families with young children. For them, the pandemic could have a negative effect on financial asset holdings.

This richness of mechanisms makes it nearly impossible to identify the importance of each factor individually. Therefore, I ask respondents directly which reason played a crucial role in their decision making process. The BOP asks to a representative sample of around 2,000 German households questions about expectations of macroeconomic variables, personal income and consumption. In August 2020, I included 3 to 6 questions for each respondent with whom I can group households into four types. Between March 2020, which marks the beginning of Covid-19 restrictions, and August 2020, respondents could have either i) not participated in financial asset markets ii) not adjusted their portfolio, iii) bought, or iv) sold assets. Each type receives a set of reasons which could

be influential in their decision. The task is then to rank each factor from very to not important.

Asking households directly is appealing in this context as importance of individual factors can be identified. Therefore, it assumes that answers can be trusted and respondents are aware of their *true* decision making process.¹ While these assumptions might not hold for all respondents, a general ranking order of factors might still be valid and informative.

The rest of the paper is structured as follows. First, Section 2 summarizes the literature on drivers of financial decisions as well as household expectations. Afterwards, section 3 discusses the questionnaire and describes the data. The core section 4 analyzes the role of factors and expectations on financial asset decisions. Lastly, section 5 assesses generality of the results and section 6 concludes.

2 Literature Review

This paper builds upon two large literature strands; the equity premium puzzle and the growing expectations literature.

The equity premium is defined as the excess return on financial assets to the riskfree rate. Given this, economic models cannot rationalize the low number of stock holders using *reasonable numbers* for relative risk aversion parameters (See Mehra and Prescott (1985); Haliassos and Bertaut (1995) for early discussions and Gomes, Haliassos, and Ramadorai (2021) for a recent literature review).² The puzzle is twofold. First, the low participation in the stock market (intensive margin) and second, the relative low share of risky assets of total portfolio (extensive margin) (Campbell, 2006). The literature accumulated various factors which can be grouped in two categories: risk and participation costs.

One explanation focuses on risks faced by households. In particular, the correlation between labor income and stocks can limit participation (e.g., Benzoni, Collin-Dufresne, and Goldstein (2007)). Other background risks such as housing (Cocco, 2005) or health (Guiso, Jappelli, and Terlizzese, 1996) reduce stock holdings as well. Nevertheless, Catherine (2020) argues that renters do have larger idiosyncratic income risk which reduces their stock market participation.

When it comes to stock market risks, workhorse models such as Capital Asset Pricing Model (CAPM) argue that through macroeconomic shocks, market volatility increases which decreases the share households want to invest in risky assets. Additionally, Malmendier and Nagel (2011) argue that experiencing stock market crashes can have long lasting effects on financial risk taking behavior and find evidence in the US. A similar study by Ampudia and Ehrmann (2017) uses European data and confirms the results.

As these risk factors are not enough to match empirical moments, another venue imposes a small participation cost for everyone who wants to enter equity markets (e.g.

¹See Choi and Robertson (2020) for a brief discussion about survey methodology.

²The actual size depends on measurement, time and space (see Van Ewijk, De Groot, et al. (2012) for a meta analysis)

Vissing-Jorgensen (2003); Haliassos and Michaelides (2003); Gomes and Michaelides (2005)). The idea is that financial asset decisions are costly and only a fraction of households are willing to pay that price. While direct costs such as setting up a brokerage account only make a small part of it, a large literature explores indirect costs. The latter concerns psychological costs or barriers which need to be overcome. While these cannot be directly paid with money, the household has to allocate time and effort which could have been spent otherwise on more pleasant things. While these are not *costs* in the narrow sense, but should be more thought of as *barriers* or *opportunity costs*, I still will refer to them as such.

An early study by King and Leape (1987) uses the Survey of Consumer Financial Decisions and shows that more than one third of non-participants argue that ‘they did not know enough about it’ as a reason of their non-participation. These information costs can consist of unawareness of financial products, differences within them, how financial markets work and how to invest. For the former, Guiso and Jappelli (2005) find that socioeconomic variables such as education, wealth, income, year of birth, as well as long-term bank relations, social interaction and newspaper readership increases the awareness which then leads to a higher probability of stock market participation.

Regarding financial literacy, Lusardi and Mitchell (2011) show that many households lack knowledge of basic economic principles. Drivers are education, gender, race, and location. Several papers show the strong link between financial literacy and stock market participation. For instance, Guiso, Haliassos, Jappelli, et al. (2002) use Italian data, Hochguertel, Alessie, and van Soest (2002); Van Rooij, Lusardi, and Alessie (2011) Dutch and Börsch-Supan and Eymann (2002) German data.

Gathering information about financial products, making the decision, and implementing it takes time. Hence, the opportunity cost of doing so is either work or leisure. Bonaparte, Cooper, and Zhu (2012) models the adjustment of one’s portfolio as a proportion of income. Nevertheless, Choi and Robertson (2020) find that time constraints play only an important factor for 3% of nonparticipants.

Additionally, thinking about one’s finances might even entail additional disutility. Shapiro and Burchell (2012) highlight the importance of ‘financial anxiety’ or ‘phobia’ as a driver of financial illiteracy. Choi and Robertson (2020) report that in the US 37% of nonparticipants stated that ‘not liking to think about one’s finances’ was a very or extremely important factor of their non-stock holding. Hence, allocating time into these decisions can be even more costly than opportunity costs.

On the contrary, social interaction and peer-effects can lower participation costs. The mechanism is that gaining information is costly and ‘word-of-mouth’ communication can lower these costs (Brown, Ivković, Smith, and Weisbenner, 2008). Additionally, Hong, Kubik, and Stein (2004) argue that individuals have pleasure in discussing recent stock markets dynamics and choose it as a casual conversation topic. Examples of these effects on stock market behavior are plenty and consist of parental transmission (Chiteji and Stafford, 2000), workplace (Duflo and Saez, 2002), neighbors and church communities (Hong, Kubik, and Stein, 2004; Brown, Ivković, Smith, and Weisbenner, 2008).

The second class of literature focuses on expectations of traders/ households and

their financial asset investments. This paper relates to stock market return, inflation, and house price expectations.

Arrondel, Calvo Pardo, and Tas (2014) find that participation among households increases monotonically with stock market expectations and Choi and Robertson (2020) show that expected higher returns are very or extremely important by a quarter of all stock market participants. For wealthy retail investors, Giglio, Maggiori, Stroebel, and Utkus (2019) confirm the mechanism.

The effect of expected inflation and the probability to buy financial assets is less clear. Empirically, higher inflation can have a short-term negative impact on stock prices, but a possible positive long term effect (eg Anari and Kolari (2001)). Campbell and Vuolteenaho (2004) list three reasons for a negative short-term correlation. Firstly, inflation itself, or nominal interest rate increases by central banks, decreases profitability of companies. The former can be explained by sticky prices meaning that not all companies can adjust their prices while the latter means higher lending costs for capital. Secondly, periods of higher inflation have also higher risks which investors might not like and thirdly, investors might fail to adjust the decomposition of nominal prices into constant real rates and increasing inflation which leads to an undervaluation in high inflation periods (Modigliani and Cohn, 1979).

Nevertheless, the question how households react to higher inflation expectations can have other reasons. For instance, Candia, Coibion, and Gorodnichenko (2020) find that households have a *stagflationary view* and connect inflation with a negative impact on the economy. This contrasts the classic Phillips Curve thinking of professional forecasters, where high inflation correlates with low unemployment and high output.

Furthermore, this paper analyses the relationship between financial asset decisions and expectations of house prices. Sutton et al. (2002) analyze house price changes as a response to a shock in equity prices. They find that in the US, UK, Canada, Australia, Netherlands, and Ireland a 1% increase in equity prices leads to a 1 to 10% higher house prices within 3 years. They rationalize the finding with an increase in housing demand due to a wealth effect on equity prices and that the stock market reflects expectations of national income. Nevertheless, they conjecture that in the US, stock market investments might be a substitute for housing assets and finds that in years of high investments in equity markets, demand of housing decreases.

Cocco (2005) shows that household finance models with housing can explain the lower share of equity holders as households who already invested in housing have limited resources to invest in the equity market. Additionally, house price risks lead to a crowding out effect of stock holdings.

3 Data

The data source of this paper is the ‘*Bundesbank Online Pilot Survey on Consumer Expectations*’ (BOP)³, which is a monthly survey conducted by Deutsche Bundesbank

³This paper uses data from the Bundesbank Online Pilot Survey on Consumer Expectations. The results published and the related observations and analysis may not correspond to results or analysis of the data producers.

since April 2020⁴. A representative sample of around 2,000 German households per wave report their expectations about the development of inflation, house prices and interest rates in Germany as well as their past and planned expenditures and socio-demographic characteristics. In addition to questions which are asked on a regular basis, each wave has room for specific research questions.

3.1 Key Variables

In August 2020 (wave 8), households were asked three to six questions regarding their stock market behavior.⁵ Figure 1 shows the survey timeline. Firstly, respondents are asked if they held any financial assets (stocks, bonds, funds, others⁶) actively in their portfolio prior to the Covid-19 pandemic. In case one of these questions is affirmed, the amount can be selected as a categorical variable. Secondly, I document their behavior between March and August. Here, respondents report whether they bought, sold or left their portfolio unchanged with a follow up question about the market value of these changes.

Based on the answers, respondents could belong to one of four types: *no participation* (if they had no stocks before and haven't bought any), *no adjustment* (if they had stocks before, but haven't adjusted their portfolio), *bought* (if they bought during the period), and/or *sold* (if they sold during the period). Each type receives a specific set of additional question with possible reasons for their behavior. Here, individuals are asked to rank the reasons on a four point scale from strongly agree to strongly disagree⁷.

For analyzing the responses I either use indicator variables which are one if the reason is above the respondents average of all factors. Alternatively, I follow Choi and Robertson (2020) and construct a standardized variable (Z_i) based on the formula:

$$Z_i = \frac{X_i - \bar{X}}{\sigma} \quad (1)$$

using mean (\bar{X}) and standard deviation (σ) of all answers of one respondent. The advantage is that each reason becomes more comparable within and across observations as the standardization takes care of the fact that perception of 'agreement' might differ among participants. Additionally, observations where all answers receive the same score are filtered out. These do not add any value and might even be a sign of low motivation and quality of the response.

3.2 Expectation data

The BOP is rich in consumer expectations questions. It asks households about various macroeconomic variables in multiple formats. This paper exploits expected house prices

⁴The pilot phase covers the months April to June 2019, see Beckmann and Schmidt (2020) for details.

⁵The complete questionnaire can be found in the appendix A or at [Bundesbank website](#).

⁶The questionnaire contains info boxes about each asset type.

⁷The order of the answers is generated randomly for each respondent to avoid that scores depend on the order of question.

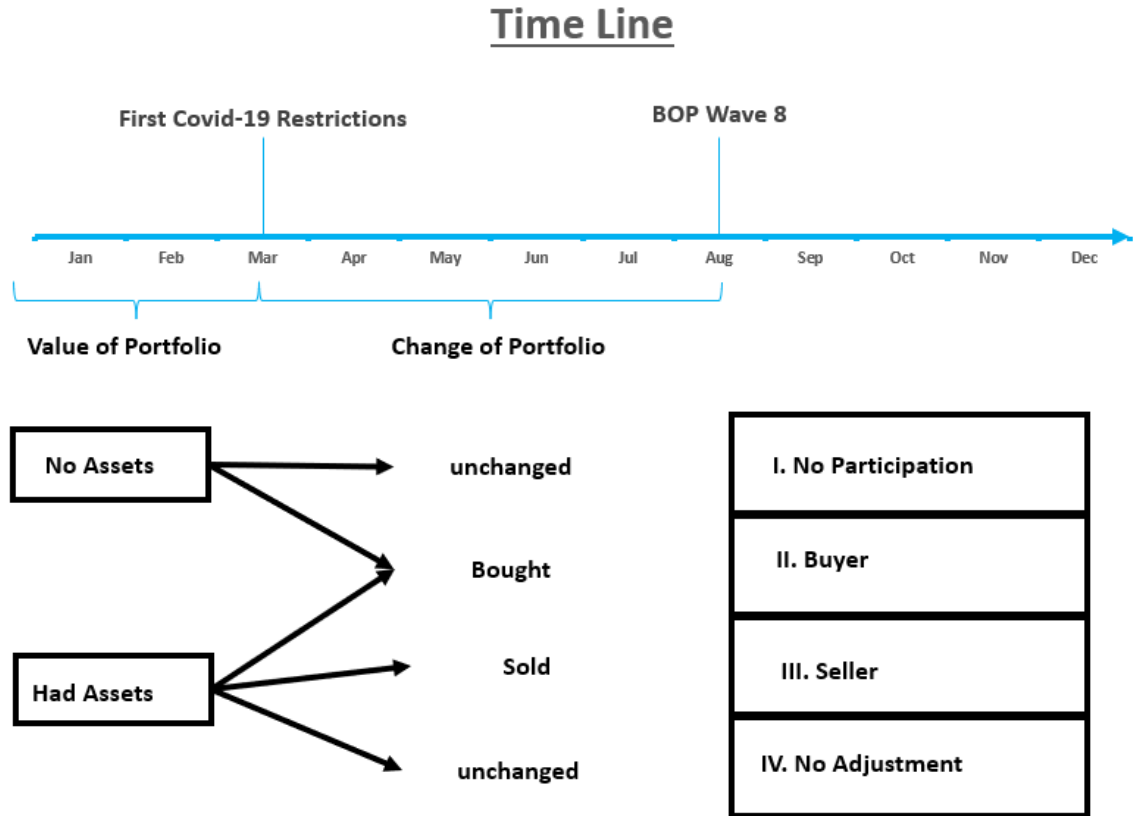


Figure 1 Time Line of the Questionnaire

and inflation and their role on buying financial assets. For both variables, respondents provide a qualitative statement, as well as a point estimate. Additionally, for inflation, respondents have to fit a distribution. Asking the same question in a different format increases robustness, as survey answers might differ substantially (Potter, Del Negro, Topa, and Van der Klaauw, 2017; Diercks, Tanaka, and Cordova, 2021).

For house prices, the BOP asks how rents and property prices in the area of the respondent change over the next 12 months. Options to answer range from decrease significantly to increase significantly with 5 steps. The point estimate is not bounded, but I winsorize the answers to 95% in order to erase outliers.

The same holds true for inflation expectations. For the qualitative indicator, I add questions concerning ‘lending rates’ and ‘fuel prices’ as they all relate to price increases. For the probabilistic inflation expectation, households have to allocate 100% into 10 bins ranging from deflation will be 12% and higher to inflation will be 12% and higher. In line with Engelberg, Manski, and Williams (2009) I fit either a generalized beta, triangular or uniform distribution.⁸ As a result, I calculate mean, standard deviation, and 90-10 percentile spread to assess magnitude and uncertainty.

⁸Sample code can be found in [GitHub](#). Thanks to Tao Wang for sharing and collaborating.

4 Results

This section shows descriptive statistics of the Bundesbank Online Pilot wave 8 and compares it with the Panel on Household Finances (PHF) to validate the representative nature of the sample. Afterwards, I categorize respondents into four types: no participation, no adjustment, bought, and sold. First, I will describe each type and analyze demographic drivers. Second, I investigate the reasons for their decision. Here, I rank them and compare which factors are most important. Afterwards I conduct a principal component analysis to investigate how the reasons are related to each other, reduce factors and dig into heterogeneous drivers of each component. Lastly, I focus on the decision of buying and expectations.

4.1 Summary Statistics of Types

Table 1 reports summary statistics for the different types. Columns (I) and (II) show that around half of all respondents do not hold any financial assets and a quarter did have some in their portfolio prior Covid-19, but did neither buy nor sell any until the interview took place. Hence, one quarter or 50% of all stock holders adjusted their portfolio between March and August 2020. This is the same share as Bonaparte, Cooper, and Zhu (2012) calculate for the US using the PSID and a two year span. About 16 % report to have bought additional assets (column III). Here, funds and bonds were the most preferred asset types. Around 2 % sold some assets, and 4% bought and sold in the same time period.

Table 2 assesses the representative nature of the data. Column (VI) shows demographics of the full sample and column (VII) from the PHF which is the standard reference when it comes to household finance data in Germany. Given that the BOP is an online survey it attracts more respondents below 30 and fewer above 60. Therefore, fewer retired and more low income households are part of the sample. Additionally, the BOP has a lower share of self-employed respondents, but more home owner. In terms of financial assets, 44% of BOP hold financial assets while only 30% do so in Germany. Here, especially funds and bonds holdings are above the German average. Therefore, the sample is relatively representative, but the mentioned differences have to be taken into account. Nevertheless, thanks to higher financial asset holdings, I have a larger share of buyers and sellers to analyze.

Additionally, the table reports a demographic breakdown for each type and table 3 confirms multiple results from the literature in a regression design. Characteristics such as college degree, male, higher income and home ownership increase not only the likelihood to hold financial assets, but to adjust as well. Interestingly, respondents younger than 30 were more likely to buy than older cohorts, while self-employed were more likely to sell.

Hence, during this six month period, one fifth of German households invested more money into risky assets. Especially younger people used the pandemic to seize the opportunity. This is in line with reports from DAI (2021).

Table 1 Summary Statistics of 5 types

		No Participation (I)	No Adjustment (II)	Bought (only) (III)	Sold (only) (IV)	Bought and Sold (V)
Total	%	55.2	23.1	16.1	1.7	3.9
	€			6,100	-12,700	1,200
	sd			(15,400)	(23,800)	(11,500)
Funds	%			71.9	46.8	59.2
	€			2,700	-5,800	0
	sd			(8,600)	(12,500)	(4,500)
Bonds	%			44.3	43.1	81.4
	€			2,400	-3,800	1,700
	sd			(8,300)	(13,000)	(11,400)
Stocks	%			7.0	9.5	13.5
	€			100	-100	-300
	sd			(1,000)	(400)	(2,400)
Other	%			14.3	22.1	32.1
	€			900	-3,000	-300
	sd			(5,600)	(10,600)	(3,500)
n		1,013	513	364	39	90

Summary statistics of 5 types in the sample. This table shows the share of households belonging to each type, by how much they adjusted their portfolio and the corresponding standard deviation. All results are weighted.

4.2 Reasons of behavior

In the previous section, we have seen that around 75% of the sample did not adjust their financial asset holdings, while a quarter of all observations bought and/or sold some assets. This section investigates the underlying reasons of the respective behavior.

4.2.1 Reasons No Participation

First, I will focus on the question: *What prevents individuals from holding stocks?*⁹

Table 4 reports the answers of individuals who did not hold any financial assets prior March 2020 and decided not to buy any afterwards. Individuals could rate each reason from 1 ‘strongly disagree’ to 4 ‘strongly agree’. The first column reports the share of individuals who rated the reason ‘fully agree’, while the second column adds respondents who also ‘rather agree’d. Columns three and four report mean and standardized variable.

⁹The question reads: ‘Why did you decide not to buy any asset(s) during the coronavirus pandemic?’

Table 2 Summary Statistics of 5 types

	No Participation (I)	No Adjustment (II)	Bought (only) (III)	Sold (only) (IV)	Bought and Sold (V)	Total (VI)	PhF (VII)
Female	54.9	50.3	29.9	33.5	28.6	48.4	46.7
Age							
<30	23.2	15.8	27.6	20.0	29.8	22.4	12.2
31-40	16.5	17.8	16.4	16.3	8.6	16.5	16.9
41-50	14.9	14.5	17.3	15.2	26.1	15.6	16.7
51-60	18.9	21.4	18.1	7.6	15.9	19.0	18.5
60+	26.5	30.6	20.6	41.0	19.6	26.5	35.7
HH Size							
1	26.1	21.1	24.7	29.8	27.5	24.8	40.6
2	38.2	40.4	32.1	40.1	42.6	37.9	34.2
3+	35.7	38.5	43.2	30.1	29.9	37.3	25.2
College	16.5	23.3	29.9	32.4	33.8	21.2	21.8
Employment							
full-time	36.8	40.8	56.6	37.7	51.8	41.5	35.3
part-time	14.4	13.7	7.8	3.2	14.6	13.0	13.7
retired	25.8	27.6	18.3	34.9	20.6	25.0	30.8
self-employed	3.5	3.6	3.2	6.9	6.9	3.7	7.1
unemployed	19.5	14.2	14.1	17.4	6.1	16.8	13.1
HH income							
<1500	15.2	6.7	3.1	21.5	7.1	11.1	18.1
1500-3000	35.2	33.4	31.0	12.9	32.8	33.6	26.0
3000-5000	32.6	37.8	38.5	35.8	32.2	34.8	26.8
5000-8000	10.1	16.2	18.9	26.8	17.7	13.5	17.5
8000+	6.9	5.9	8.4	3.0	10.1	7.0	11.6
Owner	47.4	66.7	65.3	43.6	51.9	54.9	43.9
Financial Assets							
Total	-	100.0	93.0	100.0	97.2	43.5	30.3
Funds	-	77.8	75.0	69.6	69.2	33.9	15.6
Bonds	-	47.2	54.5	47.8	81.9	23.7	3.1
Stocks	-	28.5	15.1	13.0	21.9	10.1	10.9
Other	-	19.3	18.4	27.7	44.4	9.6	15.3

Summary statistics of the demographics of the 5 types. Column six shows the full sample and column seven gives a comparison with the Panel of Household Finance wave 3. This table shows the percentage of respondents in each type. All results are weighted.

In line with the literature, a conglomeration of reasons prevent households from participating in financial asset markets. The two most important factors which are supported by around 70% of respondents are *lack of information* and *lack of interest*, followed by distrust in the stock market, time constraints and peer-effects (around 60% agree). Interestingly, *no savings* plays still for more than 50% a larger role, but ranks relatively low. Hence, a sizable proportion of nonparticipants have the resources to acquire financial assets, but choose different savings options.

Table 3 Regression Table: Types and Demographics

	(1) No Participation	(2) No Adjustment	(3) Has Bought	(4) Has Sold
college	-0.351*** (0.084)	0.096 (0.091)	0.316*** (0.092)	0.279** (0.123)
female	0.285*** (0.083)	0.063 (0.097)	-0.469*** (0.088)	-0.347*** (0.123)
< 30	-0.062 (0.130)	-0.227 (0.176)	0.365*** (0.128)	0.209 (0.176)
owner	-0.400*** (0.083)	0.304*** (0.096)	0.269*** (0.092)	-0.097 (0.131)
fin illiterate	0.463*** (0.151)	-0.229 (0.192)	-0.565*** (0.157)	-0.046 (0.194)
full-time	-0.236 (0.145)	-0.034 (0.173)	0.402** (0.162)	0.373* (0.220)
part-time	-0.122 (0.185)	0.012 (0.237)	0.252 (0.204)	0.417 (0.274)
retired	-0.107 (0.159)	0.015 (0.185)	0.126 (0.177)	0.453* (0.246)
self-employed	-0.062 (0.227)	-0.083 (0.246)	0.192 (0.229)	0.609** (0.294)
< 1500	0.417*** (0.141)	-0.280* (0.148)	-0.570*** (0.183)	0.043 (0.209)
Observations	2018	2018	2018	2018
Controls	Yes	Yes	Yes	Yes

Probit model with Type as dependent variable on demographics. Additional controls are: has children and short-time work.
Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Looking at the lower end of the scale, the recent stock market crash due to Covid-19 is still for almost a quarter important, but seems to play a relatively minor role compared to the other factors. Similarly, monetary costs such as bank fees and moral issues are only important for a small fraction of households.

A comparison with the literature is not easy as evidence is scarce. Especially for Germany and a tumultuous period as 2020. In line with Choi and Robertson (2020), who interviewed US households in 2016, information, interest and distrust rank very high. Two noticeable differences are that half of their sample states that ‘their wealth is too small to invest in stocks’ is very or extremely important which they capture as *participation costs*. A similar proportion at least rather agrees with the statement that they do not have any savings in my sample. The question is if non-participation emerges from low wealth or no savings or if households see them as the same thing. Nevertheless, given that other factors score higher, *participation costs* might consist of more than a pure wealth effect. Second, they capture time constraints with the statement ‘intended

Table 4 Summary Statistics: Reasons No Participation

	Fully agree (I)	At least rather agree (II)	Mean (III)	Standardized (III)
no information	51%	73%	3.3	0.6
no interest	47%	70%	3.2	0.5
distrust	38%	63%	3.0	0.3
too risky	35%	59%	2.9	0.2
no time	33%	58%	2.8	0.1
peer-effect	30%	51%	2.7	-0.1
no savings	30%	54%	2.7	-0.1
high valuations	18%	52%	2.6	-0.2
shock	24%	46%	2.5	-0.2
costs	20%	43%	2.4	-0.3
moral	16%	32%	2.2	-0.7

Summary statistics of reasons why households did not participate in the financial asset market between March and August 2020. The first column reports the share of individuals who rated the reason 'fully agree', while the second column adds the answer 'rather agree'. The third column shows the mean (1-4 with 4 'fully agree') and the fourth column reports the mean of the standardized variable. The latter is constructed by using the average and standard deviation of all questions by each respondent.

to invest in stocks but never got around to it' which only 3.2% found very or extremely important. Rephrasing the question and looking at a shorter 6 month period, time constraints become much more relevant.

By looking at demographic drivers in table 20 (Appendix B), we can see that respondents give sensible answers. For instance, the factor *no information* plays a larger role for households who reported that inflation will be above 30% which I use as a proxy for financial illiteracy. Additionally, respondents with a monthly income of 1,500€ were more likely to report that *no savings* hindered them investing compared to households who earn between 3,000 and 8,000€. Interestingly, the table reveals that *no time* scored higher for female respondents and self-employed. For the latter, *prices fall* was a more important reason than unemployed showing that they might have had a more pessimistic outlook of the economy. Female respondents were also more likely to state that they have no interest in the stock market. Hence, the time constraint could result from other obligations or that more time is necessary to spark interest and start thinking about ones finances.

Principal Component Analysis Next, I conduct a principal component analysis to show how many factors are relevant and how they relate to each other. Table 5 shows the result following Choi and Robertson (2020) and Tabachnick, Fidell, and Ullman

(2007) considering components with an eigenvalue of more than 1 as well as focusing on variables with a loading factor of more than 0.32.¹⁰

Three factors explain 47.45% of the variance in the data. The first factor captures *risk aversion* of households. It consists of four variables: ‘Financial assets are too risky for me at the moment’, ‘I do not trust the stock market’, ‘The recent collapse in financial market prices puts me off’, and ‘Prices will fall again or fall lower’.

The second component captures *lack of resources*. It consists of ‘lack of interest’, ‘lack of information’, ‘time constraints’, and ‘lack of savings’. Here, households would like to participate in the stock market, but the participation costs or impediments are too large to overcome.

The third factor consists of ‘lack of savings’ and ‘moral issues’, while the latter is negatively correlated. Hence, these households would like to invest, but the lack of additional money prevents them from doing it.

Table 5 Principal Component Analysis: Reasons No Participation

Comp 1 risk aversion		Comp 2 lack of resources		Comp 3 no savings	
too risky	0.42	no interest	0.47	no savings	0.64
distrust	0.42	no information	0.40	moral	-0.60
shock	0.37	no time	0.40		
high valuations	0.35	no savings	0.34		
		shock	-0.33		

Principal component analysis of all factors from table 4. I use for each variable an indicator if the reason ranks above their own average and varimax rotation (no or promax rotation give similar results). Loadings above 0.32 are shown.

In another step, a regression analysis evaluates driving factors of each component. For this, I take the mean value of corresponding standardized variable and regress them on demographics. As using too many insignificant controls can bias the other estimators, I estimate a parsimonious model. Table 6 shows that risk aversion is increasing in age, while *lack of resources* decreases with age and is higher for female respondents. *Lack of savings* is more prominent for unemployed and low income households.

Take away #1 In summary, multiple factors play an important role in the decision of no participation for different types of people. Overall, lack of information and interest are the foremost reasons, followed by risk factors and time constraints. To reduce number of factors, they can be grouped into a *risk*, *lack of resources* and *lack of savings* component which are driven by either a life-cycle pattern or income levels.

4.2.2 Reasons No Adjustment

Next, I focus on individuals who held some financial assets, but did not buy nor sell between March and August. Here, I restrict myself to reasons of not buying, as this

¹⁰The results do not change if unrotated factors or different rotation methods are used.

Table 6 Regression Table: Principal Component of Reason for No Participation and Demographics (Parsimonious model)

	(1) Risk Aversion	(2) Lack of Resources	(3) Lack of Savings
age	0.007*** (0.001)	-0.009*** (0.001)	
female		0.094** (0.044)	
unemployed			0.323*** (0.086)
< 1500			0.294*** (0.089)
Observations	812	823	828
Adjusted R^2	0.071	0.105	0.059

OLS model with principal component as dependent variable on demographics.
Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

seemed to be the more relevant decision of households compared to selling.¹¹¹² Therefore, I need to separate respondents who were more likely to buy from ones who were on the verge of selling. For this, I use their expectation of stock market prices. If respondents gave an above average score to the reason ‘prices will decline’, their best action would be to sell rather than buy additional financial assets. Hence, I can restrict myself to the group who did not expect declining prices.

These reasons refer more to ‘adjustment costs’, meaning the households overcame the ‘participation costs’ already, but some factors prevent them from investing *more*. Table 7 reports the results. What we can see is that all reasons score relatively equal. Time constraints, the lack of additional savings, and risk assessment are the most important factors and are supported by half of the respondents. These are factors which might have been most affected by the pandemic. Additionally, peer-effects and transaction costs are still supported by around 40% of all non-adjusters.

Regression of demographics on each reason can be found in table 23 in Appendix B. One takeaway here is that self-employed gave a lower score to ‘time constraints’, but a larger one to having ‘no additional savings’. This might reflect the struggle of self-employed during Covid-19 pandemic.

¹¹The question reads: ‘Why did you decide not to buy any more assets during the coronavirus pandemic’

¹²I don’t include reasons for both cases to reduce the number of questions. Focusing on buying rather than selling might be more fruitful, as Kahneman and Tversky (1979) argue that individuals tend to avoid realizing losses. Psychological papers labeled this phenomenon *avoiding regret* (Anderson, 2003). Hence, households tend to sit out a crisis rather than sell now and thus, are more likely to adjust by buying rather than selling, even if they have expectations of falling prices. The larger number of buyers than sellers in my sample supports that view. Additionally, the interview takes place in August when the stock market already recovered strongly which makes the question why people did not take advantage of the situation more appealing.

Table 7 Summary Statistics: Reasons No Adjustment

	Fully agree (I)	At least rather agree (II)	Mean (III)	Standardized (III)
no time	22%	57%	2.5	0.4
no savings	27%	51%	2.5	0.3
too risky	19%	51%	2.4	0.2
peer-effect	23%	43%	2.3	0.0
costs	13%	39%	2.2	-0.2

Summary statistics of reasons why households did not adjust their portfolio between March and August 2020, but held stocks before. The first column reports the share of individuals who rated the reason 'fully agree', while the second column adds the answer 'rather agree'. The third column shows the mean (1-4 with 4 'fully agree') and the fourth column reports the mean of the standardized variable. The latter is constructed by using the average and standard deviation of all questions by each respondent.

Principal Component Analysis By conducting a PCA, three factors explain 69% of the variation. Table 8 divides the reasons why people did not adjust their portfolio in three groups. The first captures *bad timing*. It consists of 'too risky', 'costs' and 'peer effects'. All of them indicate that the person is aware of the stock market, but did not change the portfolio as the timing of investment is bad, or they lack advice from friends and family.

The second factor captures *lack of savings* which covers 'no savings' as well as 'peer-effects' (negative), meaning that close contacts of the respondent did buy, but they had no financial resources to invest themselves. The last factor captures *time constraints* exclusively.

Table 8 Principal Component Analysis: Reasons No Adjustment

Comp 1 bad timing		Comp 2 lack of savings		Comp 3 time constraint	
too risky	0.62	no savings	0.90	no time	0.99
costs	0.60	peer-effect	-0.37		
peer-effect	0.50				

Principal component analysis of all factors from table 7. I use for each variable an indicator if the reason ranks above their own average and varimax rotation (no or promax rotation give similar results). Loadings above 0.32 are shown.

Take away #2 Households postponed further investments either because they thought the timing is bad, or other obligations prevented them from allocating time and effort into investment decisions.

4.2.3 Reasons bought

The first two paragraphs focused on what prevents households from holding or adjusting any financial assets. Now, I ask the question: *What factors make households overcome these impediments?*¹³

Table 9 Summary Statistics: Reasons Bought

	Fully agree (I)	At least rather agree (II)	Mean (III)	Standardized (III)
low valuations	39%	64%	2.8	0.9
savings plan	44%	62%	2.8	0.9
time	8%	27%	1.8	-0.1
information	8%	24%	1.7	-0.1
less consumption	4%	19%	1.6	-0.3
more income	4%	20%	1.6	-0.3
peer-effect	4%	14%	1.5	-0.4
bank fees	0%	4%	1.2	-0.6

Summary statistics of reasons why households bought financial assets between March and August 2020. The first column reports the share of individuals who rated the reason 'fully agree', while the second column adds the answer 'rather agree'. The third column shows the mean (1-4 with 4 'fully agree') and the fourth column reports the mean of the standardized variable. The latter is constructed by using the average and standard deviation of all questions by each respondent.

Table 9 reports a much clearer picture, as more than 60% at least rather agreed and around 40% fully agreed with two statements. First, *low valuation*, meaning expecting higher stock market values in the future led to their investment decision, and second, households bought assets using a (pre-existing) *savings plan*. Moreover, additional time and information played an important role for around a quarter of respondents, while a reduction in bank fees, which is the only physical cost, is a minor factor.

By focusing on demographic drivers in table 10, most variation can be captured by either an income or cohort effect. Column 1 shows that *low valuation* is more important for respondents with a monthly income of less than 1,500€ compared to 1,500-5,000€, while having a *savings plan* or more savings due to *less consumption* has the opposite effect. The reasons *more time* and *peer-effect* are more prominent for people below 30.

¹³The question reads 'Why did you decide to buy the asset(s) after the coronavirus pandemic began?'

Table 10 Regression Table: Reason bought and Demographics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	prices rise	savingsplan	time	information	less consumption	more income	peer-effect	bank fees
college	-0.067 (0.121)	0.100 (0.150)	-0.164 (0.102)	-0.060 (0.110)	0.042 (0.084)	-0.052 (0.086)	0.196** (0.089)	0.005 (0.051)
full-time	0.096 (0.215)	0.229 (0.303)	-0.345* (0.209)	0.127 (0.236)	0.094 (0.152)	-0.117 (0.177)	0.021 (0.201)	-0.103 (0.119)
part-time	0.036 (0.268)	0.037 (0.361)	-0.480** (0.233)	0.350 (0.337)	0.203 (0.198)	-0.034 (0.225)	0.048 (0.224)	-0.158 (0.125)
retired	0.557* (0.328)	-0.492 (0.360)	-0.190 (0.272)	-0.126 (0.298)	0.421** (0.210)	-0.096 (0.202)	0.165 (0.238)	-0.236* (0.134)
self-employed	0.251 (0.284)	-0.057 (0.361)	-0.231 (0.270)	0.223 (0.297)	0.107 (0.196)	-0.224 (0.215)	0.118 (0.229)	-0.183 (0.156)
female	-0.163 (0.129)	0.187 (0.155)	-0.028 (0.101)	0.075 (0.136)	-0.084 (0.085)	-0.166** (0.082)	0.163* (0.094)	0.016 (0.044)
short-time work	-0.297 (0.301)	-0.082 (0.376)	0.079 (0.242)	-0.007 (0.172)	0.549** (0.226)	-0.016 (0.275)	-0.096 (0.218)	-0.130 (0.102)
children	-0.026 (0.166)	0.038 (0.188)	0.067 (0.105)	0.194 (0.170)	-0.126 (0.083)	-0.038 (0.111)	-0.081 (0.096)	-0.030 (0.055)
1500-3000	-0.801** (0.316)	0.695* (0.376)	0.092 (0.267)	-0.073 (0.377)	0.503*** (0.161)	0.174 (0.283)	-0.590* (0.346)	0.001 (0.211)
3000-5000	-0.594* (0.329)	0.903** (0.403)	0.142 (0.272)	-0.126 (0.376)	0.357** (0.149)	-0.094 (0.270)	-0.534 (0.345)	-0.055 (0.215)
5000-8000	-0.264 (0.327)	0.531 (0.402)	0.127 (0.286)	-0.245 (0.374)	0.335* (0.171)	0.093 (0.276)	-0.480 (0.347)	-0.097 (0.224)
8000+	-0.214 (0.359)	0.276 (0.431)	-0.139 (0.286)	-0.323 (0.419)	0.392* (0.208)	0.110 (0.305)	0.093 (0.374)	-0.193 (0.212)
owner	0.152 (0.134)	-0.340** (0.171)	0.182 (0.122)	-0.050 (0.130)	0.005 (0.089)	0.054 (0.102)	-0.010 (0.087)	0.004 (0.054)
31-40	-0.191 (0.213)	0.323 (0.249)	-0.493*** (0.168)	0.146 (0.231)	0.028 (0.162)	0.258 (0.171)	-0.340** (0.145)	0.274*** (0.073)
41-50	-0.236 (0.164)	0.650*** (0.244)	-0.355* (0.190)	-0.135 (0.175)	0.021 (0.134)	0.111 (0.142)	-0.475*** (0.138)	0.421*** (0.074)
51-60	-0.523*** (0.194)	0.463* (0.275)	-0.282 (0.206)	0.140 (0.207)	-0.035 (0.138)	0.161 (0.156)	-0.379*** (0.140)	0.453*** (0.085)
60+	-0.499* (0.270)	0.544* (0.288)	-0.264 (0.243)	0.440* (0.230)	-0.223 (0.186)	-0.039 (0.152)	-0.434** (0.175)	0.473*** (0.093)
fin illiterate	0.033 (0.323)	-0.129 (0.420)	0.176 (0.237)	-0.080 (0.176)	-0.267 (0.200)	-0.043 (0.208)	0.200 (0.341)	0.110 (0.090)
first time	0.195 (0.202)	-0.868*** (0.271)	0.688*** (0.185)	0.045 (0.236)	-0.266*** (0.102)	0.382* (0.223)	-0.070 (0.251)	-0.107 (0.091)
bought & sold	0.518*** (0.131)	-0.957*** (0.175)	0.217 (0.132)	0.461*** (0.172)	-0.165* (0.092)	-0.017 (0.094)	0.013 (0.100)	-0.079 (0.049)
Observations	435	438	438	437	438	438	434	436
Adjusted R^2	0.098	0.197	0.136	0.054	0.054	0.033	0.174	0.148

OLS model with standardized version of reason as dependent variable on demographics.
Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

I include dummies for first time buyers as well as individuals who bought and sold

to see which reasons make households participate or re-balance. For the former, having *more time* (column 3) is very important as well as an increase in income.

Lastly, households who re-balanced did so because of the *low valuation*, and additional *information*. These households are less likely to be guided by *savings plans*.

Active vs Passive Buyers Interestingly, the two most relevant reasons (low valuation and savings plan) are almost mutually exclusive. Hence, respondents were either passive buyers, if a savings plan is an above average reason, or active, if they expected prices to rise. By grouping them as such, around 64% account as passive, 30% as active and a remainder of 6% is neither.¹⁴

Next, I use a probit model to see which demographic characteristics as well as the remaining reasons for buying determine active or passive buyers. The first two columns in table 11 contain the full sample, while the others condition on having bought. This exercise shows that younger (below 30), wealthier (home owner) households are more likely to be active buyers. Additionally, they are more likely to be first time buyers or re-balanced during the 6 month period.

Columns 5 and 6 indicate that active buyers were also more likely to state that additional time, information, income and a peer-effect led them to the decision to buy. Contrarily, passive buyers are less responsive to these factors. For them, having a savings plan is the only important reason for their decision.

By Asset type Table 12 highlights which asset types respondents bought. One striking result is that if households already held an asset type before, they were much more likely to invest in the same one again. Additionally, the value held predicts a higher probability of investing in the same asset type. Note that the results hold true even if we only look at active buyers.

This result highlights the importance of information costs. Researching investment alternatives is costly, while sticking with known asset types reduces effort and time.

Take away #3 German households either bought because they had a (pre-existing) savings plan or they seized the opportunity and expected prices to rise. The latter were younger, richer and more likely to enter the market as well as re-balance. Interestingly, only they also reported that additional time, information, income, or peer-effects influenced their decision. Finally, households seem to stick with the asset category they already held and are familiar with.

¹⁴Note that German savings plans or *Fond sparen* is different from 401k plans, as they are private without any contribution of the employer. Households invest each term (month or quarter) a fixed amount of money in either multiple funds, bonds or specific stocks.

Table 11 Regression Table: Active vs Passive buyers (Probit)

	(1) active	(2) passive	(3) active	(4) passive	(5) active	(6) passive
owner	0.465*** (0.130)	0.112 (0.100)	0.512*** (0.196)	-0.369* (0.191)	0.535*** (0.200)	-0.485** (0.203)
< 30	0.536*** (0.172)	0.134 (0.138)	0.622** (0.245)	-0.252 (0.252)	0.416 (0.256)	-0.215 (0.274)
first time	1.710*** (0.343)	0.712** (0.342)	0.711** (0.344)	-0.941*** (0.341)	0.424 (0.330)	-0.591* (0.324)
bought & sold	1.677*** (0.201)	0.851*** (0.184)	0.703*** (0.214)	-0.836*** (0.212)	0.767*** (0.225)	-0.948*** (0.223)
time					0.703*** (0.126)	-1.152*** (0.136)
information					0.206* (0.121)	-0.899*** (0.128)
less consumption					0.224 (0.170)	-0.820*** (0.167)
more income					0.415** (0.172)	-1.120*** (0.157)
costs					0.871*** (0.270)	-2.069*** (0.301)
peer effect					0.742*** (0.166)	-1.534*** (0.170)
Observations	2018	2018	454	454	431	431
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Probit model with active (no savingsplan, but expects rising stock market) or passive (has savingsplan) as dependent variable on demographics and other reasons. Additional controls are: college, gender, labor status, short-time work, has children, and income.

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4.2.4 Reasons sold

Lastly, I focus on the question: *Why do households sell their financial assets?*¹⁵ As we have seen above, this group consists only of around 6% of households in the sample (N=129) which indicates that the results should be received with caution.

Table 13 shows that around 40% of households either wanted to cash in their profits (or prevent further losses) as they expected falling prices and/or invest in other vehicles

¹⁵The question reads: 'Why did you decide to sell the asset(s) after the coronavirus pandemic began'

Table 12 Regression Table: Has bought by asset type (Probit)

	(1) Funds	(2) Bonds	(3) Stocks	(4) Other
female	0.276 (0.241)	-0.099 (0.200)	0.479 (0.340)	-0.503* (0.297)
owner	-0.761*** (0.258)	0.720*** (0.254)	-0.524 (0.380)	0.263 (0.288)
has funds	2.527*** (0.317)	-0.699** (0.327)	1.219** (0.553)	-0.771* (0.408)
has bonds	0.063 (0.341)	1.432*** (0.263)	0.538 (0.399)	0.036 (0.382)
has stocks	-0.241 (0.380)	0.203 (0.389)	2.192*** (0.395)	-0.057 (0.490)
has other	-0.321 (0.329)	0.901*** (0.325)	0.150 (0.427)	2.027*** (0.349)
value funds	0.108** (0.047)	-0.085* (0.051)	-0.127* (0.070)	-0.021 (0.059)
value bonds	-0.143** (0.061)	0.206*** (0.051)	-0.040 (0.075)	-0.191*** (0.067)
value stocks	0.010 (0.079)	-0.032 (0.079)	0.045 (0.067)	-0.035 (0.104)
value other	-0.088 (0.062)	-0.142** (0.062)	-0.170 (0.112)	0.193*** (0.071)
first time	0.570 (0.414)	1.098*** (0.379)	0.000 (.)	0.900* (0.461)
bought & sold	-0.419* (0.222)	0.452 (0.276)	-0.598* (0.326)	-0.139 (0.316)
Observations	454	454	430	454
Controls	Yes	Yes	Yes	Yes

Probit model with has bought asset type as dependent variable on demographics and portfolio prior to the Covid-19 pandemic. Additional controls are: college, labor status, short-time work, has children, income, cohort, and financial literacy.
Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

(*re-balancing*). These reasons are followed by risk assessment. A quarter of individuals state that the recent shock scared them away from the stock market or they sold because of an increase in uncertainty. Lastly, a need for liquidity due to debt obligations or consumption played only a limited role over all.

Table 14 shows the underlying heterogeneity of the factors. Two interesting points can be made here. First, financial illiterate households, defined as respondents who expect inflation to be above 30%, are more likely to re-balance, but less likely to be affected by their peers. The second point is that households who need money to repay debt (column 6) or find the current situation too risky (column 4) were driven out and did not buy other financial assets.

Principal Component Analysis The principal component analysis (table 15) indicates that four factors explain 68% in variation. The first one consists of reasons related

Table 13 Summary Statistics: Reasons Sold

	Fully agree (I)	At least rather agree (II)	Mean (III)	Standardized (III)
high valuations	12%	41%	2.3	0.8
re-balancing	24%	44%	2.3	0.7
shock	7%	27%	1.8	0.2
too risky	7%	23%	1.7	0.1
need consumption	7%	18%	1.5	-0.2
need debt obligations	6%	13%	1.4	-0.3
no time	4%	12%	1.4	-0.3
peer-effect	0%	11%	1.3	-0.4
need support friends/family	2%	7%	1.2	-0.5

Summary statistics of reasons why households sold any assets between March and August 2020. The first column reports the share of individuals who rated the reason 'fully agree', while the second column adds the answer 'rather agree'. The third column shows the mean (1-4 with 4 'fully agree') and the fourth column reports the mean of the standardized variable. The latter is constructed by using the average and standard deviation of all questions by each respondent.

to the *crisis*. Either the increase in risk or even the stock market fall let them to sell assets. The second factor consists of reasons with *personal consumption*. The third concerns a *social component*, meaning either respondents sold because others did as well or they wanted to support friends and family. Lastly, some households *re-balanced*

Take away #4 The key insights of this exercise is that most households sold to prevent future losses and/or re-balance their portfolio. Additionally, some households reduced their risk exposure due to an increase of risk or the recent shock experience.

4.3 Expectations and Investing

In this section, I want to exploit survey questions on household expectations. The focus here is on the question *How do expectations on stock market prices, property prices, and inflation influence financial asset decisions of households?*

4.4 Buying financial assets and stock market expectations

The reader might have noticed that I ask all types if their expectations on stock market developments played a large or minor role for their investment decision. While I asked buyers if they expected increasing prices, I rephrased it for the other types as expecting decreasing prices. By constructing a variable across types for expecting increasing asset prices, and regressing that on being a buyer, we get table 16. The robust finding is that buyers had higher expectations than non-buyers or households who sold only. Each column entails a different version of the variable. While in column one, I use an indicator

Table 14 Regression Table: Reason sold and Demographics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	prices fall	re-balancing	shock	too risky	need consumption	need debt obligation	no time	peer-effect	need support friends and family
college	0.296 (0.273)	0.117 (0.278)	-0.255 (0.185)	0.300* (0.166)	-0.549** (0.228)	-0.354* (0.180)	0.094 (0.155)	0.510*** (0.161)	-0.160* (0.085)
full-time	0.801* (0.418)	-0.240 (0.376)	0.630* (0.354)	-0.160 (0.366)	-0.181 (0.474)	-0.162 (0.507)	-0.639* (0.380)	-0.290 (0.284)	0.240 (0.239)
part-time	0.546 (0.712)	-0.049 (0.825)	0.304 (0.425)	0.012 (0.537)	-0.407 (0.599)	0.213 (0.637)	-0.173 (0.455)	-0.323 (0.310)	-0.123 (0.286)
retired	0.638 (0.603)	-0.758 (0.656)	0.094 (0.470)	-0.269 (0.445)	0.347 (0.519)	0.122 (0.535)	-0.324 (0.457)	-0.064 (0.340)	0.214 (0.282)
self-employed	-0.027 (0.546)	0.077 (0.681)	0.359 (0.433)	-0.288 (0.462)	0.631 (0.670)	0.037 (0.508)	-0.850** (0.420)	-0.143 (0.320)	0.204 (0.261)
female	0.320 (0.338)	0.451 (0.327)	-0.336 (0.254)	-0.314* (0.189)	0.085 (0.246)	-0.145 (0.196)	-0.167 (0.136)	0.028 (0.098)	0.077 (0.083)
short-time work	-0.258 (0.491)	-1.644* (0.889)	-1.127* (0.632)	-0.353 (0.489)	1.479** (0.729)	0.982 (0.605)	-0.183 (0.484)	0.261 (0.381)	0.842 (0.585)
children	0.139 (0.304)	-0.583* (0.337)	-0.241 (0.220)	-0.014 (0.214)	0.355 (0.250)	0.140 (0.261)	0.034 (0.164)	-0.089 (0.136)	0.258** (0.104)
1500-3000	0.170 (0.478)	0.652 (0.445)	-0.136 (0.480)	0.128 (0.431)	0.386 (0.463)	0.243 (0.333)	-0.664* (0.390)	-0.570 (0.372)	-0.210 (0.264)
3000-5000	-0.087 (0.442)	0.522 (0.483)	-0.184 (0.460)	0.177 (0.425)	0.558 (0.459)	0.501 (0.387)	-0.707* (0.386)	-0.589* (0.345)	-0.192 (0.255)
5000-8000	0.539 (0.504)	0.436 (0.504)	-0.370 (0.484)	0.181 (0.457)	0.167 (0.481)	0.029 (0.366)	-0.225 (0.413)	-0.592 (0.372)	-0.165 (0.269)
8000+	0.111 (0.567)	-0.027 (0.608)	-0.149 (0.540)	0.398 (0.505)	0.495 (0.482)	0.419 (0.367)	-0.646 (0.419)	-0.598 (0.381)	-0.003 (0.264)
owner	0.194 (0.294)	-0.159 (0.352)	0.172 (0.195)	-0.181 (0.186)	-0.003 (0.249)	-0.023 (0.193)	0.157 (0.132)	-0.038 (0.128)	-0.118 (0.075)
age	0.001 (0.013)	0.000 (0.017)	0.017** (0.009)	0.019** (0.008)	-0.017 (0.011)	-0.012 (0.009)	-0.005 (0.006)	-0.002 (0.006)	-0.002 (0.004)
fin illiterate	-0.203 (0.462)	1.387*** (0.500)	0.654 (0.472)	0.097 (0.334)	-1.056** (0.493)	-0.375 (0.444)	0.188 (0.427)	-0.837** (0.376)	0.145 (0.277)
bought & sold	0.237 (0.298)	1.409*** (0.266)	-0.343 (0.232)	-0.475** (0.216)	-0.339 (0.249)	-0.536** (0.236)	-0.115 (0.161)	0.094 (0.171)	0.068 (0.081)
Observations	117	117	117	117	117	117	117	117	117
Adjusted R^2	0.073	0.205	0.100	0.123	0.091	0.109	0.248	0.229	0.216

OLS model with standardized version of reason as dependent variable on demographics.
Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 15 Principal Component Analysis: Sold

	Comp 1 Crisis	Comp 2 Lack of Resources	Comp 3 Social Component	Comp 4 Re-balancing
too risky	0.59	need debt obligations	0.66	peer effect 0.75
shock	0.56	need consumption	0.65	need support friends and family 0.56
no time	0.44			
high valuation	0.34			

Principal component analysis of all factors from table 13. I use for each variable an indicator if the reason ranks above their own average and varimax rotation (no or promax rotation give similar results). Loadings above 0.32 are shown.

variable which is one if ‘low valuations’ is an above average answer, for the second one, I only use the answer ‘fully agree’, while for the next one I add ‘rather agree’ as well. The last column uses all steps from one to four. Note that this sample includes passive buyers who did not say they bought due to increasing prices.

Table 16 Regression Table: Has bought and Expectations of Stock Market Prices (Probit)

	(1) Has bought	(2) Has bought	(3) Has bought	(4) Has bought
low valuations (above average)	0.164* (0.090)			
low valuations (fully agree)		0.578*** (0.098)		
low valuations (rather agree)			0.401*** (0.088)	
low valuations (all values)				0.124*** (0.046)
Observations	1859	1859	1859	1859
Controls	Yes	Yes	Yes	Yes

Probit model with has financial assets bought as dependent variable on stock market expectations. Controls are college, gender, labor status, short-time work, has children, income, home ownership, cohort, and financial literacy. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Buying financial assets and house price expectations Table 17 for conditional on having financial assets) shows the results of the probit model regressing an indicator variable which is one if the person bought on expectations and controls. The first three columns use qualitative statements. Here, respondents were asked if they expect house prices or rents in their area of residency to decrease significantly, decrease slightly, stay roughly the same, increase slightly or increase significantly which translates to values 1-5. The first column uses property prices of home owner and rents for renter, as each group might be more aware of either variable. It shows that having a more optimistic outlook for housing prices, reduces the probability of buying by 15% points. This effect is similar for owners and renters (columns 2 and 3), even though it means expected wealth increases for owner and additional rent payments for renter.

Columns four to six capture quantitative statements. Here, a 1% point higher estimate reduces the probability of buying financial assets by 2.6% points. Interestingly, the effect is stronger for renters than owners.

There are multiple reasons to explain this behavior. For owners, there is either a

Table 17 Regression Table: Has bought and Expectations of Property Prices
(Probit)

	(1) All	(2) Owner	(3) Renter	(4) All	(5) Owner	(6) Renter
housing quali	-0.144*** (0.045)					
prop quali		-0.144*** (0.055)				
rent quali			-0.150* (0.079)			
house price wins				-0.011* (0.006)	-0.002 (0.008)	-0.023** (0.011)
Observations	2018	1261	757	2018	1261	757
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Probit model with has financial assets bought as dependent variable on property price expectations. Controls are college, gender, labor status, short-time work, has children, income, home ownership, cohort, and financial literacy.

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

crowding out effect or higher house price risks. The former would mean that households want to invest more into housing and save less in other liquid assets, as the return on housing investment is high. Alternatively, higher expected house prices could also lead to an increase in house price risk if the household perceives it as a bubble. Therefore, to reduce aggregate risk exposure, no additional stock market risk exposure is wanted.

A wealth effect could be ruled out, as the estimates for owner and renter are of similar magnitude. Higher house price expectations do not increase the wealth of renters, but might lead to higher rent payments in the future.

Moreover, if we see renters as a transition towards buyers, higher expected house prices could mean they want to buy sooner. Assuming that for the down-payment financial assets are going to be liquidated, the household could start to reduce risk of stock market volatility and liquidate early.

Buying financial assets and inflation expectations The third relationship connects expected inflation with the probability to buy financial assets. Table 18 shows the effect of expected inflation and the probability to buy using a variety of expectation forms. All indicating that higher expected inflation reduces the probability of buying financial assets.

The first column uses the average of qualitative statements *inflation rate*, *interest of*

credit, and *fuel prices*. All of them measure increases in prices to some degree. The results estimate that an increase in one category decreases the probability of buying financial assets by 23.4% points. Columns 2-6 use point estimates. Here, columns 3 and 4 control for financial illiteracy measured as an indicator variable which is 1 if respondents expected inflation/deflation to be larger than 30% or even 10%. Column 5 and 6 only keep answers which range between 0 and 10% or 0 and 5% respectively. This is done to limit the importance of outliers and prove robustness.

Columns 7 and 8 make use of probabilistic statements. Here, respondents were asked to state how likely each inflation bin is, ranging from -12 to +12%. Column 7 uses the expected inflation estimate, while column 8 adds the standard deviation of each probability distribution. What can be seen is that not only the point estimate is important, but uncertainty about inflation reduces the probability to buy as well.

Table 18 Regression Table: Has bought and Expectations of Inflation (Probit)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
inflation quali	-0.235*** (0.074)							
inflation PE wins		-0.049*** (0.010)	-0.051*** (0.010)	-0.044*** (0.012)				
fin illiterate: inflation > 30			0.116 (0.184)					
fin illiterate: inflation > 10				-0.151 (0.194)				
0 < inflation < 10					-0.115*** (0.025)			
0 < inflation < 5						-0.141*** (0.034)		
inflation prob exp							-0.047*** (0.016)	-0.084*** (0.019)
inflation prob sd								-0.534*** (0.180)
Observations	2014	2018	2018	2018	1825	1662	1716	1716
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Probit model with has financial assets bought as dependent variable on inflation expectations. Controls are college, gender, labor status, short-time work, has children, income, home ownership, and cohort.
Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The literature offers two explanations for this finding. First, Candia, Coibion, and Gorodnichenko (2020) find that households have a ‘stagflationary’ view and connect high inflation with low output. Hence, if growth expectations are connected with stock market returns, households might not want to buy. Second, higher inflation expectations

could lead to higher interest rates through monetary intervention. As this increases costs for firms, profitability decreases and share prices as well.

To test these two explanations, I use a proxy for a pessimistic economic outlook¹⁶ as well as expected increase in interest rates¹⁷. Table 19 shows that both explain higher inflation expectations. Nevertheless, they cannot rationalize why inflation expectations reduce the probability to buy (column 5) as the coefficient remains significant and unchanged in magnitude. Therefore, other explanations might be important which the literature has missed so far.

Table 19 Regression Table: Inflation expectations:
Stagflation vs Central bank intervention

	(1) inflation	(2) inflation	(3) inflation	(4) Bought	(5) Bought
pess economy	0.326*** (0.090)		0.325*** (0.090)		-0.010 (0.021)
interest rates change		0.556** (0.282)	0.556** (0.277)		-0.118** (0.058)
inflation PE wins				-0.051*** (0.010)	-0.051*** (0.010)
Observations	2016	2016	2014	2018	2014
Controls	Yes	Yes	Yes	Yes	Yes

Columns 1-3: OLS model with point estimate of inflation expectations as dependent variable and columns 4-5: Probit model with has financial assets bought as dependent variable. Variable *pess economy* measures the extent to which respondents find the economy 'is a serious problem at present' which varies from 1 to 10. *interest rates change* uses the qualitative statement of interest rates will increase strongly (4) to decrease strongly (1). Controls are college, gender, labor status, short-time work, has children, income, home ownership, cohort, and financial literacy.

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Take away #5 This exercise showed a robust relationship between higher inflation expectations and a reduced likelihood to buy. Similarly, higher house price expectations crowd out financial asset investments.

5 Robustness: TBC

All Tables can be found in Appendix B.

¹⁶The question ask 'to what extent do you think' the economy 'is a serious problem at present?' where 1 means no problem at all and 10 an extremely serious problem.

¹⁷Here I use the qualitative statement if the respondent thinks interest rates will decrease or increase.

Experienced stock market returns One caveat of looking at demographic drivers of the principal component of risk aversion in section 4.2.1 is that it might not be a pure age effect, but that experienced stock market returns matter. Hence, I construct these variables based on Malmendier and Nagel (2011) and add them to the regression. Table 28 and 27 show the results for the parsimonious model as well as with all controls. What can be seen is that the relationship gets weakened. Hence, experienced stock market returns explain higher risk aversion by age to a small degree.

Alternative construction of PCA components Another objection could occur due to the construction of the principal components. In the baseline results, I use indicator variables for each reason which is 1 if the reason is above average. This reduces clutter and makes the PCA more reliable, as the standardized variable inherits correlation across factors by construction. Nevertheless, when bundling the reasons to one component, I use the standardized variables. In table 29 I take the mean of all above average reasons. The results seem to be robust, even though the correlation between ‘lack of resources’ and age is weakened.

Inflation Distribution Estimation The baseline calculation uses the mean of each bin to construct mean and standard deviation. A more sophisticated version is using Engelberg, Manski, and Williams (2009) and fitting a distribution. The benefit is that standard errors and especially a 90 to 10 percentile spread can be calculated. Table 30 shows the results. While mean inflation expectations is still negatively correlated with the probability of being a buyer, the standard error as well as the spread is no significant.

6 Conclusion

This paper analyzes financial asset decisions made by German households during the early stages of the Covid-19 pandemic. As this period is characterized by multiple changing factors simultaneously, I ask respondents directly about their reasoning to identify the importance of each reason.

Using the BOP-HH survey wave 8, I find that lack of information and interest play a significant role in preventing households from investing in the first place. In case they already held some financial assets, time constraints as well as risk factors prevents further investments. This study shows that buyers can be split into active ones who are driven by stock market expectations and other factors and passive investors who primarily bought due to a (pre-existing) savings plan. Interestingly, higher house price and inflation expectations reduces the likelihood to invest in financial assets.

The results can be used to compare the importance of factors preventing households from investing as well as making them buy financial assets. Additionally, it suggests that the Covid-19 pandemic influenced the decision of households. Like in any recession, financial market risks, as well as personal background risks increased. What made this period interesting is that time constraints played for some households a larger role in

preventing financial asset investments, while for others, it was a good time to start buying. These might have long lasting effects.

Some limitations need to be taken into consideration. First, the respondent of the interview might not be the household head in charge of financial decisions. Hence, the household might have acted differently than the reported. Additionally, only reasons can be compared which were part of the questionnaire. Thus, factors such as relationships with financial advisors, time until retirement or next large expenditure might have been important. Additionally, information if respondents intermitted their savings plan can not be taken into consideration.

There are multiple ways this paper can be used as a starting point for future research. First, respondents who did not adjust their portfolio scored relatively low at the reasons brought up in the literature. Hence, a closer look at what prevents households from re-balancing or purchasing additional assets is a worthy exercise. In particular, what are the differences from participation costs which the literature focuses most on.

Second, while the study investigates household behavior during Covid-19, it is interesting to see how much the pandemic affected each reason. Hence, conducting the same interview in *non-pandemic* times could shed light on how investment behavior changed. Therefore, we could see if this period has a permanent effect on stock market participation.

- End probability to adjust portfolio
- Structural model on how Covid-19 changed asset investments

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