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Abstract

We present evidence from a repeated survey on risky asset holdings carried out on a representative sample of the German population six times between April and June 2020. Given the size of the Covid-19 shock, we find little evidence of portfolio rebalancing in April 2020. In May, however, individual investors started buying heavily, fueling market recovery. The cross-section shows large differences as young, educated, high income, and risk tolerant investors are net buyers throughout and, thus, benefit from the stock market recovery. Older individuals, parents of young children, and individuals affected by adverse liquidity shocks from Covid-19 are net sellers. Given the high risk of illness, older people are hit by dual blows to both health and finances.

JEL Classification: D31 (distribution of personal income and wealth), G50 (household finance), H31 (fiscal policies and household)

Keywords: risky assets; distributional effects; individual investment behavior; health and income shocks; expected adverse shocks

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1 Introduction

The Covid-19 crisis in early 2020 sent a shockwave to the global economy, rocking financial markets. In February and March of 2020, stock markets fell by more than 30 percent, the strongest decline in history over such a short time period (see Baker et al., 2020). Thereafter, surprising for many, stock markets and other risky assets quickly recovered within the next few months. Standard portfolio theory predicts that rational investors react to such large price changes in risky assets by rebalancing their portfolios, buying in declining markets and selling during recovery (e.g., Calvet et al., 2009). However, increased risk and uncertainty during a crisis may also lead to the opposite pattern, selling first and buying later when uncertainty declines (e.g., Fagereng et al., 2018; Altig et al., 2020). Regardless, rebalancing decisions provide enormous potential for gains and losses during a period like this, with considerable impacts on the distribution of income and wealth. How did investors behave overall during this turbulent period? Did they rebalance their portfolio structures, and did they buy or sell risky assets? How did specific groups behave? What impacts did their behavior have on the wealth distribution, and what are the implications for policy?

In order to answer these questions, we used data from SOEP-CoV, a repeated cross-sectional survey of a representative sample of the adult German population conducted as part of the German Socio-Economic Panel (SOEP) study. The SOEP-CoV database consists of six survey waves conducted between April and the middle of June 2020 on investing behavior in risky financial assets (to which we refer in the following simply as risky assets). The data provide us with relatively high-frequency, but still representative, information on a very turbulent period (with a sharp drop and a quick recovery in stock markets and other risky assets). This combination is unique, to the best of our knowledge, and allows for analysis of the dynamic behavior of an entire population of individuals holding risky (financial) assets (in contrast to bank-specific data).

Overall, we find that individual investors react very little in the beginning but begin buying heavily thereafter, with a high degree of heterogeneity and with adverse distributional effects. Specifically, we obtain five results. First, there is a large degree of inaction, with just up to 10 percent (increasing from 6.4 to 10.6) of individuals who hold risky assets rebalancing their portfolios during the first months of the Covid-19 crisis, that is, from April to early May 2020. Second, net buying of risky assets gains momentum continuously over our sample period

(up to 25 percent rebalancing in the last wave). Third, rebalancing as well as buying behavior is much more prevalent among "informed" investors, who benefit from the recovery on the stock market. These individuals are younger, better educated, higher in net income, and higher in risk tolerance. The net sellers during rising markets are older, have children at home, or have been affected by crisis-related liquidity shocks. Within the group of net sellers, older people are hit by dual impacts of the pandemic: first by the financial effects, and second by the higher risk of severe illness. Fourth, these results suggest that the impact of the Covid-19 shock on risky asset holdings has clear distributional consequences that affect some household groups in particular. While higher-income net buyers benefit from the crisis, net sellers are unable to profit fully from the recovery of risky asset prices. As a result, the financial market dynamics widen the wealth gap between these groups. This result is related to the literature showing that return heterogeneity increases wealth inequality due to the prevalence of undiversified portfolios (see Campbell et al., 2019, and, indirectly related to COVID-19, Hanspal et al., 2021). Fifth, our results present a contrast to results from studies based on different samples: individual investors in Germany rebalance less than those in the United States (see Hanspal et al., 2021) and they also trade less than customers of a discount broker (Ortmann et al., 2020).

It follows that our results cannot be generalized across all countries. The more reluctant trading behavior of German relative to US investors may be influenced by low stock market participation in Germany and the small share of risky assets in Germans' total financial wealth. If this portfolio structure is important, then results from Germany may apply to further continental European countries with similar portfolio characteristics (see Arrondel et al., 2016).

Our findings on individual investors' behavior toward risky assets in Germany during the first months of the Covid-19 crisis are unique, to the best of our knowledge. They shed new light on investor behavior during crises and provide a nuanced picture of the resulting distributional consequences. In the beginning of our sample period, when risky asset prices were at a low point, even a 30 percent fall in stock prices did not generate more rebalancing activity. The inaction of retail investors that we observe at this stage is considered essentially a stylized fact in the literature (see Calvet et al., 2009; Gomes et al., 2021). However, this initial inaction does not fully describe investors' behavior over our sample period. Individuals rebalance their portfolios to an increasing degree and ultimately become heavy net buyers of risky assets. Thus, toward the end of the period, the investors in our sample behave more as expected according to standard portfolio theory. However, the delayed rebalancing may reflect some rational inattention due to the very high uncertainty early in the novel pandemic situation.

Moreover, rebalancing may have been intensified by trend-following behavior in line with the strong market recovery (Greenwood and Shleifer, 2014). Nevertheless, the buying was not misguided on average, as markets improved over subsequent months (until June 2021).

The cross-sectional results show broad heterogeneity in decisions. Being informed is definitely helpful, while some groups of individuals are negatively affected by the crisis, such as older people, individuals with children, and those expecting liquidity constraints. These latter investors tend to lose money as they sell at relatively low prices. Interestingly, the crisis does not lead to general panic selling of risky assets by individuals, although the Covid-19 shock is unique in the post-World War II era, in which no other similarly abrupt downturn has taken place in the economy with a concomitant decline in stock prices. From a general perspective, the Covid-19 crisis could be seen as a situation of higher background risk – in that it increased risks in the areas of both health and unemployment – which is generally expected to lead to a decrease in risky asset holdings (Guiso and Paiella, 2008). However, this is not what we find on average. The net selling we observe seems related to various constraints on specific groups of people, such that the increased background risk affects individuals very selectively.

Literature. The literature on analyzing the Covid-19 crisis is growing rapidly. There are several strands of literature, most of which are not related to our research, in particular a wealth of macroeconomic papers using infection models and other approaches (e.g., Eichenbaum et al., 2020). A more specific set of papers use micro data to analyze firm behavior (e.g., Balleer et al., 2020). The line of research examining individuals' labor market outcomes (Adams-Prassl et al., 2020), consumption behavior (e.g., Baker et al., 2020; Carvalho et al., 2020), and the consequences of increased inequality (Adam-Prassl et al., 2020; Palomino et al., 2020) is much closer to our paper. Research on individual investment behavior focuses on specific assets in a specific sample (e.g., Döttling and Kim, 2020). Ortmann et al. (2020) analyze all retail investor trades using a discount broker up to April 17, 2020, and find that investors increase trading activity between February 23 and March 23 (i.e., before our sample starts) at both the extensive and intensive margin, and that trading activity and leverage go down thereafter. The closest study to ours is Hanspal et al. (2021), who conduct a survey between April 6 and 13, 2020, (i.e., roughly in parallel to our first wave) in the United States with about 7,500 observations. They find, among others, that about half of stock market holders make active adjustments, with equal buying and selling, while mentioning a more pessimistic economic outlook.

In contrast to many existing studies (such as Döttling and Kim, 2020; Ortmann et al., 2020), we use a representative sample of the population. Compared to Hanspal et al. (2021), we

observe investor behavior over a longer period of time (and in a different country) to analyze dynamic behavior; we also include information about the respondents' health situation, which seems crucial *ex ante* to fully understand behavior during the crisis. Interestingly, we note that in the Hanspal et al. (2021) sample, US investors trade more actively than German investors, but are neither clear buyers nor sellers, like Germans in the early phase of the Covid-19 pandemic (see also Section 4).

This paper is structured as follows. Section 2 describes the data we use; Section 3 analyzes risky asset holdings for the group of investors, while Section 4 examines differences in decisions across subgroups. Section 5 provides a quantitative assessment of distributional effects and Section 6 discusses policy options.

2 Data

This section describes the data we use in three sections. We document individuals' risky asset holdings before the crisis (Section 2.1), present the additional 2020 waves of the SOEP-CoV survey (Section 2.2), and show the specific survey responses on risky asset holdings (Section 2.3).

2.1 Individuals' risky asset holdings before the crisis

The German Socio-Economic Panel (SOEP) provides population-wide longitudinal data on private households in Germany since 1984. In 2019, about 30,000 persons in 15,000 households participated in the survey. The data provide information on a broad range of "objective" variables, such as income, wealth, age, gender, education, and employment status, as well as "subjective" variables, such as the willingness to take risk. At intervals of several years, the survey also includes a wealth module providing detailed information about the kind and volume of assets owned as well as debt. This module was last implemented one year before the crisis, in 2019.

The survey question of interest here utilizes a simplified distinction between risky assets and safe assets, where risk is seen as the possibility that prices of the respective asset will change. The question asks "Do you own stocks or other forms of capital investments?", which represent risky assets, and distinguishes between these and "savings accounts or instant access savings accounts," which represent safe assets. Thus, risky assets include stocks as well as mutual funds, bonds, and derivatives, while the safe assets include basically all forms of bank deposits and insurance claims. At the end of 2019, households in Germany held financial assets

worth of 6.46 billion euros, of which 23.2 percent are risky and the remaining 76.8 percent are safe, according to the distinction made (Deutsche Bundesbank, 2020). While almost all households own safe assets, 23.0 percent own risky assets, quite similar to the euro-area average of 20.2 percent (see Arrondel et al., 2016).

The associations between risky asset holdings and socio-demographic characteristics are as expected: Risky asset holders are older, more often men, better educated, have higher income, are wealthier, more risk tolerant, and less often have children at home (see Appendix Table A1 for details). These facts for Germany fit the picture for other advanced economies. Accordingly, these investors do not represent the average population but rather the upper socio-economic segments, such that distributional analyses within our sample do not apply to the lower segments of the population.

2.2 The SOEP Covid-19 survey

To allow for assessment of the situation of households during the first lockdown phase of the Covid-19 pandemic, the regular SOEP survey was supplemented by a telephone survey on Covid-19-related changes during the crisis (see Kühne at al., 2020). The survey was conducted in nine consecutive waves at one to two-week intervals from April through early July 2020.[1] In this special survey, one person in each SOEP household provides information about their personal and household situation in five domains of life, including the household's material situation and their labor market situation. Around 6,700 respondents were interviewed in total, and their responses can be linked directly, by way of their individual identification numbers, with the SOEP data from previous waves. The linkage allows us to enrich the information collected during the pandemic with pre-pandemic variables such as age, education, income, and wealth. Another advantage of this linkage is the easy application of specific weights for each wave, which ensure the representativeness of the SOEP sample. In our analyses, we generally use sample weights.

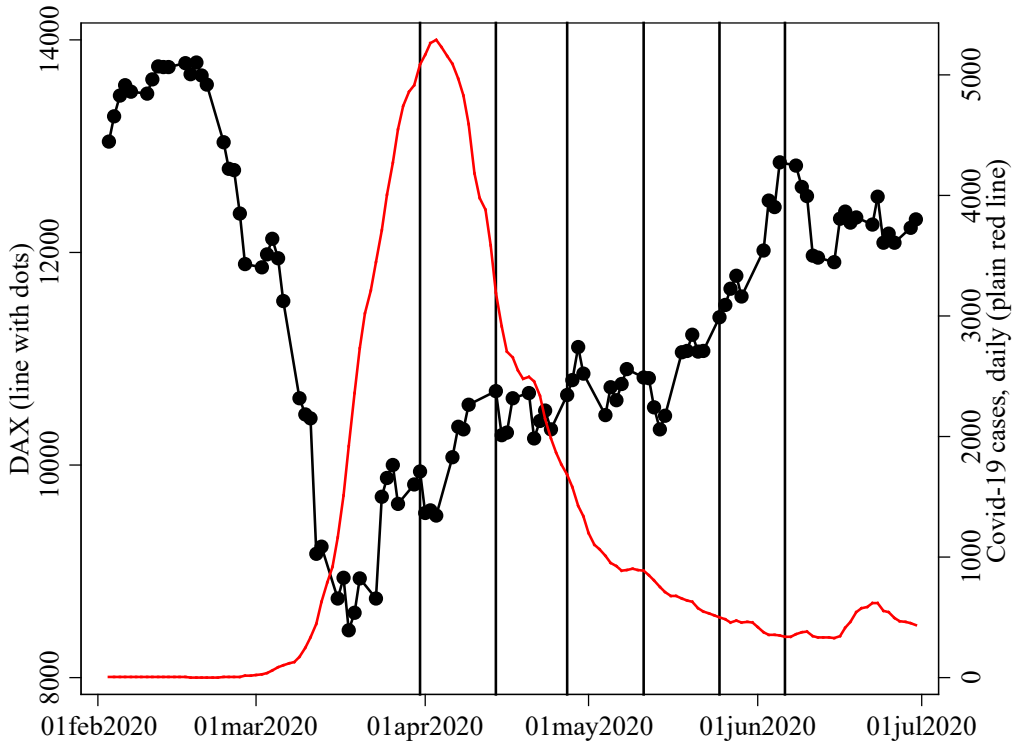
Figure 1 shows the development of the leading German stock market index, DAX, during the first half of 2020, the smoothed number of daily new Covid-19 infections in Germany, and, as vertical lines, the survey start of each of the six SOEP-CoV waves that we consider here. We omit the three following waves as these do not cover risky assets.

2.3 Survey responses on risky assets

[1] A few interviews already took place on 31 March 2020.

The exact survey questions about risky asset holdings and the responses are documented in Table 1, wave by wave. The first item asks whether the person has any risky assets, which is true of about 30 percent. The fifth wave is an outlier in this respect (with a share of 17 percent), which may occur due to the small sample size.

Figure 1: Timing of survey waves during the Covid-19 pandemic in Germany



Note. Line with dots represents the end-of-day DAX prices from the German Stock Exchange; plain line (in red) represents daily newly registered Covid-19 infections in Germany from the Robert Koch Institute (data point is the average for the last seven days); vertical lines represent the start of the six SOEP-CoV waves considered here. The first day of SOEP-CoV wave 1 / 2 / 3 / 4 / 5 / 6 is March 31 / April 14 / April 27 / May 11 / May 25 / June 2.

To test the reliability of the data, we link this information at the individual level with responses to the SOEP wealth module in 2019 about risky asset holdings. We find that the overlap is about 80 percent. Differences may occur because of (i) decisions made about risky assets during the year between both surveys, (ii) response errors, and (iii) statistical imputation of missing values. To examine the first argument, we test whether less wealth is related to a lower share of investors who hold risky assets, which may explain that investors with small portfolios and, thus, smaller risky asset positions may sell them completely or buy them newly.

Indeed, this is confirmed, as the share of investors holding risky assets increases monotonically with wealth (see Appendix Table A2).

Table 1: Descriptive statistics of risky asset holdings and changes

Variable	Survey item
Dummy holding risky assets (1=yes)	Do you own stocks or other forms of capital investments? This does not refer to savings accounts or instant access savings accounts.
Dummy restructuring portfolio (1=yes)	If the answer was yes: Have you restructured your stock portfolio or other forms of investments in the last few weeks?
Percentage of portfolio sold off	If restructuring: What percentage of positions in your portfolio have you sold off?
Percentage of portfolio added	If restructuring: What percentage of positions in your portfolio have you added to?
Dummy selling (1=yes)	If restructuring: selling
Dummy buying (1=yes)	If restructuring: buying
Dummy shareholder 2020 / 2019	Shareholders 2020 holding financial assets in 2019

	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6	All waves
Dummy holding risky assets (1=yes)	0.312	0.294	0.253	0.263	0.166	0.302	0.282
Dummy restructuring portfolio (1=yes)	0.065	0.096	0.106	0.146	0.154	0.254	0.104
Percentage of portfolio sold off	25.574	38.998	20.47	22.694	24.076	8.001	25.902
Percentage of portfolio added	20.383	23.631	37.848	21.174	37.735	36.233	27.037
Dummy selling (1=yes)	0.578	0.526	0.588	0.702	0.356	0.113	0.507
Dummy buying (1=yes)	0.653	0.661	0.767	0.826	0.639	0.838	0.724
Dummy shareholder 2020 / 2019	0.791	0.845	0.85	0.743	0.779	0.794	0.811
Number of obs.	1,670	1,907	927	628	305	295	5,732

Note. Data from SOEP-CoV and SOEP. All numbers (except the number of observations) are weighted using SOEP-CoV weights.

The second item in Table 1 shows those who hold risky assets and restructured their portfolios in the weeks prior to being surveyed. Their numbers increase continuously across the waves. The following items refer only to those who claim to have restructured their portfolios. The items provide information about the portfolio shares of buying and selling, that is, relative volumes. The results show, for example, net selling in the first wave (20.2 percent buying vs. 25.1 percent selling), where "net selling" is an approximation because we do not have information about absolute portfolio volumes. The last two items are dummies, providing

information about whether respondents buy or sell at all. It can add up to more than 100 percent if individuals are active on both sides of the market.

3 Individuals' risky asset holdings during the crisis

In this section, we consider the entire group of individuals as a whole, whereas Section 4 looks at heterogeneity across individuals. We distinguish between rebalancing (Section 3.1) and net buying (Section 3.2).

3.1 Rebalancing of risky assets

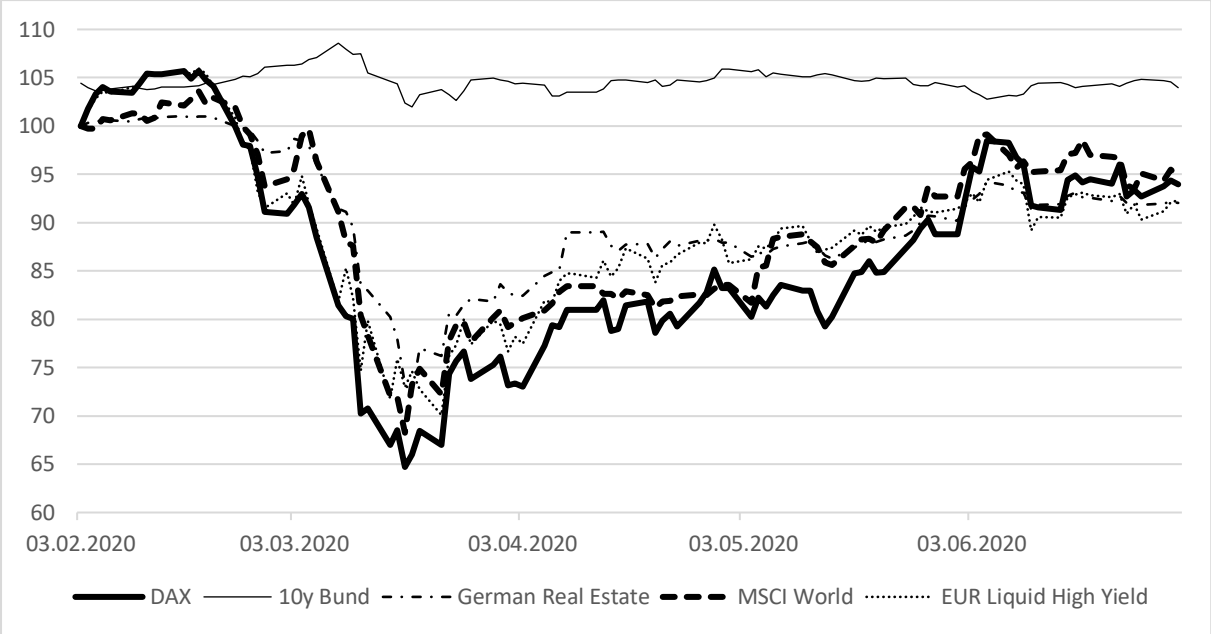
According to portfolio theory, investors decide about the relative weights of safe and risky assets in their portfolios depending primarily on their risk preference. Following mainstream theory that risk preference is an individual trait and, thus, independent of economic circumstances, as well as that individual investors act with a long-term horizon (as they do not have knowledge that would enable them to time their activities), this setup predicts that rational investors react to major price changes of risky assets, rebalancing their portfolios accordingly. Consequently, the response to a strong price decline, such as the one that occurred during the Covid-19 crisis, is to buy risky assets in order to rebalance. The survey period of the first wave that we use is until April 10, 2020. This is after the DAX, the German stock market index, reached its lowest point on March 18, 2020, closing at 8,442 and falling to 8,328 in late trading. Thereafter, the DAX rose through the end of the first survey wave, when it reached a level of 10,500. Thus, following theory, we expect strong rebalancing efforts during the severe crisis and a decline of rebalancing during stock market recovery.

The data, however, paint a different picture. During the first wave, only 6.4 percent of all individuals holding risky assets say that they had rebalanced their portfolio (see Table 1). Thus, almost 94 percent of individuals did not react to the 30 percent drop in stock markets. While it is true that German investors hold not only German but also international stocks and other kinds of risky assets, we see that there are strong positive relations between the price changes in the DAX and other risky assets (see Figure 2).

Further rebalancing activity increases consistently up to the last wave of our sample, when it reaches a share of 25.5 percent, that is, about four times higher than in the first wave. Thus, investment behavior changes dramatically over this short time period, although about three-quarters of investors did not react. While rebalancing increased over time in a recovering stock market, the DAX level during our last wave (about 12,000 in June 2020) was clearly below that

in subsequent months, with the DAX surpassing 15,000 at the end of March 2021. This indicates that even "late" investors were able to make profits (in our assessment period). Table 1 contains the exact figures. We also show the development of rebalancing and net buying of risky assets over time graphically with a fitted line in Figure 3.

Figure 2: The price development of risky assets between February and June 2020



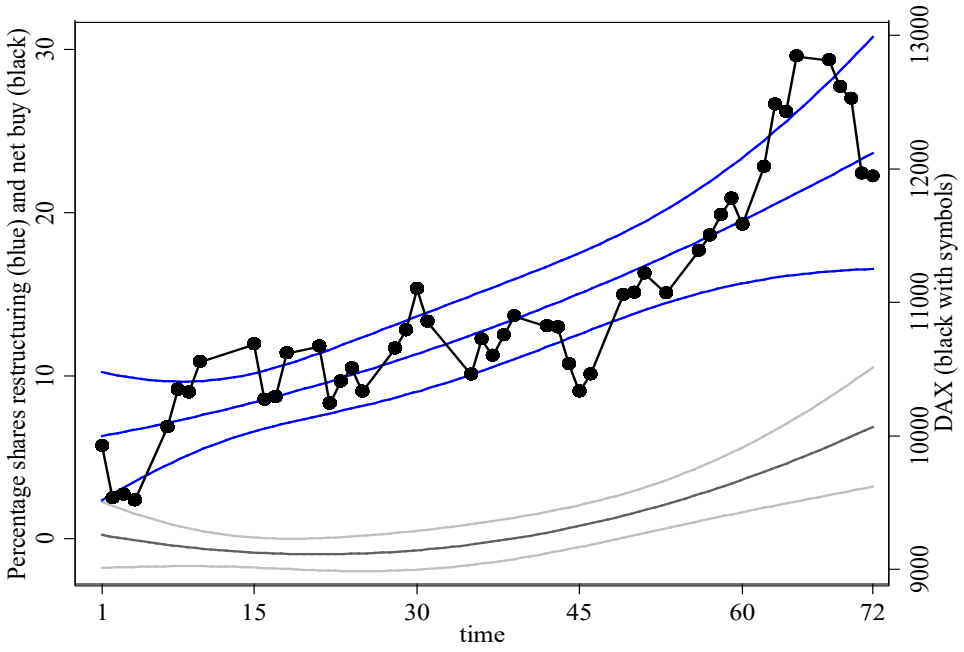
Note. DAX represents the DAX Index of the 30 largest German companies. 10y Bund represents the price of a German 10-year government bond. German Real Estate represents the MSCI German Real Estate GICS Level 1 Index of listed German real estate companies. MSCI World represents the MSCI World Index of 1,601 large and mid-cap companies across 23 developed markets. EUR Liquid High Yield represents an index of the 50 largest and most liquid in euro-denominated corporate bonds with a rating BB- to BB+.

Overall, average rebalancing activity is initially almost contrary to the theoretical rebalancing expectation: investors barely react to the stock market crash, but over time they do, clearly from wave 3 onwards, when markets have recovered to some extent and the situation seems to have stabilized. In Section 4, we analyze whether this inaction may be driven by increased background risk due to the Covid-19 shock.

3.2 Net buying of risky assets

The preceding Section 3.1 analyzes restructuring efforts as such, but the theoretical expectation from the rebalancing hypothesis is also clear about the direction of this rebalancing: Restructuring due to a market decline implies that investors will be net buyers of risky assets.

Figure 3: Rebalancing of portfolios, net buying and DAX (31.3.-12.6.2020)



Note. Black curve (starts at about 0): quadratic prediction plot with 95 percent confidence interval of percentage share net buy (difference between added risky share and sold risky share of portfolio), SOEP-CoV; blue curve (starts at about 6): quadratic prediction plot with 95 percent confidence interval of share of restructuring holders of risky assets, SOEP-CoV; black with circles: end-of-day DAX values from German Stock Exchange. Days cover working days and start with 1 (March 31, 2020, first SOEP-CoV interview in the first wave) and end with 72 (June 12, 2020, last SOEP-CoV interview in the sixth wave).

To analyze this, we calculated the difference between purchases and sales (both reported in percentages by respondents) at each wave in two ways: first, we looked at net buying regarding portfolio shares of buying minus selling (running from +100 to -100), and, second, we used dummies for the individual decisions (leading to +1, 0, or -1). Interestingly, these two ways of calculating net buying led to somewhat different results. The dummy measure, which counts the numbers of investors buying or selling, shows that individual investors mainly buy risky assets and this holds through all waves. The portfolio share measure, however, gives a different impression: During the first two waves, selling dominates, and during the last four waves, buying dominates three times (see Figure 2). Thus, selling may occur in the beginning of such a crisis and purchasing at the end (see also the respective smoothed relations in Appendix Figure A1).

Taking the information from both measures together, most decisions seem to be purchases, but the selling decisions occur with larger portfolio shares. This provides a direct

motivation to look at the characteristics of the decision makers in more detail, as done in Section 4.

4 Cross-sectional analysis of individual decisions on risky assets

It is known that individual investors behave heterogeneously and that this heterogeneity is, to some degree, related to individual characteristics. In this section, we discuss mechanisms by which the Covid-19 crisis may lead to trading activity with risky assets (Section 4.1). We then introduce variables that are informative about the individual situation during the Covid-19 crisis (Section 4.2) and analyze heterogeneity in rebalancing behavior (Section 4.3) and in the buying and selling of risky assets (Section 4.4).

4.1 Mechanisms leading to trading during a crisis

Quite generally, crises may affect the portfolio equilibrium of individuals in three ways: First, the prices of risky assets fall, such that—*ceteris paribus*—the rational response would be a rebalancing, that is, a buying of risky assets. However, the *ceteris paribus* condition does not hold for all individuals. Second, crises negatively affect the risk-bearing capacity of several types of households, which consequently feel compelled to either generate liquidity or reduce the riskiness of their portfolios and therefore sell risky assets. Third, crises may change expectations about the development of the economy and may change perceptions of risk. If people become less optimistic or perceived risk increases, the willingness to hold risky assets declines and may lead to less rebalancing or selling of risky assets.

There is indeed some evidence that the pandemic has changed expectations and risk perceptions. Bu et al. (2020) show that exposure to the pandemic reduces planned risk taking and that preferences may be affected. Hanspal et al. (2021) document that the stock market crash of 2020 changed peoples' economic expectations, and that beliefs about the duration of the stock market recovery shapes peoples' expectations about planned investment decisions. Using experimental evidence, Huber et al. (2021) show that perceptions of stock risks also depend on stock market shocks, and that this dependence differs across groups of investors. More generally, Malmendier and Nagel (2011) show in their seminal paper that macroeconomic shocks change peoples' beliefs and later-life risk taking, while Andersen et al. (2019) document that heterogeneity in experiences has differential effects on portfolio rebalancing.

These mechanisms may be at work simultaneously and interact, which complicates any analysis. Our approach is to rely on a set of variables that provide information about the

potential workings of some major mechanisms. In this sense, we use socio-demographic variables as proxies for being financially informed which show evidence of being positively related to portfolio rebalancing. Moreover, we use shock variables to analyze which individuals may be negatively affected in their risk-bearing capacity. Our data do not explicitly cover expectations and perceptions.

4.2 Individual Covid-19 shocks during the crisis

Here we make use of the broad spectrum of survey items that give information on whether individuals are negatively affected—or expected to be negatively affected—by the Covid-19 crisis. These shock variables may be objective information, such as income losses, or subjective information, such as expectations (Fetzer et al., 2021, report a strong and heterogeneous increase in economic anxiety). In detail, we focus on six items that seem to be of particular interest. For each item, we report the scale and the mean (Appendix Table A3): the first item measures whether income due to the crisis increased (+1), decreased (-1), or remained constant (in percent, mean: -9.7; i.e. more respondents report an income decrease than increase). The other items ask for the expected likelihood, scaling the probability between 0 and 100: (ii) "that the novel coronavirus will cause you to become critically ill in the next 12 months" (mean: 24.3), (iii) "lose your job" (9.3), (iv) "encounter serious financial difficulties and possibly have to apply for social welfare benefits" (6.9), (v) "have difficulties paying your bills and be forced to use your savings or take out a loan" (7.9), and (vi) "forced to use your savings or liquidate your investments" (14.3).

In sum, the data show that there are often crisis-specific income losses (despite the high level of social security in Germany), expected health risks, and financial concerns. These negative (expected) shocks may work against the conventional rebalancing, that is, buying of risky assets, in particular if individuals are heavily affected by these shocks. Do such individuals rather reduce their share of risky assets, which would be in line with the theory that background risk impacts risky asset holdings? We analyze cross-sectional decisions in the following.

4.3 Cross-sectional analysis of rebalancing

While we show that the average degree of rebalancing is quite small, specifically at the beginning of this crisis, we hypothesize that investors who could be regarded more informed will make better decisions, i.e., that they would restructure more. We expect that the following characteristics indicate being better informed (see similarly Calvet et al., 2009a): age (proxying

for experience), education, income, wealth, and risk tolerance (proxying also for openness to change). Moreover, we expect that families with children at home will have less time available, in particular if they do not have a childcare provider outside the home during the pandemic, and will thus rebalance less. Regarding the shock variables introduced in Section 4.1, we expect that negative (expected) shocks, that is, income loss, and expectations about being infected, losing their job, financial difficulties, liquidity problems, or dissaving expectations, tentatively lead to rebalancing (see Calvet and Sodini, 2014; Fagereng et al., 2018).

A logit regression explaining rebalancing by the variables introduced, that is, the sociodemographic plus the shock characteristics, provides several significant results (see Table 2, column 1). As expected, those who could be regarded as better informed do rebalance: the educated, high-income, risk-tolerant individuals and – unexpectedly – younger investors (this is also seen in the descriptive statistics in Appendix Table A4). The economic effects of these variables are non-negligible; This includes the finding that a 10 percentage point higher net income per month increases the probability of portfolio rebalancing by 0.2 percentage points. Surprisingly, old age (and, thus, more experience) and higher wealth (both variables are positively related to each other) do not explain restructuring. The same applies to families with children at home, even though the coefficients have the expected signs. Further, the Covid-19 shock variables do not predict rebalancing actions. In contrast, the gender dummy shows that women rebalance less, which is expected, as they generally trade less than men (as we show later, they also sell less than men).

In robustness checks, we vary the set of shocks because they could be related to each other. Thus, we include them either one by one in the regression or through combined measures formed by calculating an average across shocks and a geometric mean of the single shocks. Whatever we do, the results remain qualitatively the same and the shock variables are not significant in this setting (see Appendix Table A5; further specifications are not documented). In another exercise, we do not just explain the fact of rebalancing but also consider the point in time of rebalancing, that is, the earlier the better, which largely confirms the above results. At later a stage, a higher (expected) probability to dissave by liquidating investment (and lower probability to dissave by reducing savings or loans) is related to more restructuring (Appendix Table A6).

Overall, the better informed individuals decide better, with the exception of older investors, and the shocked investors do not restructure significantly more than others.

Table 2: Variables explaining various rebalancing decisions

Variable	Rebalancing vs. not rebalancing	Buying vs. not rebalancing	Selling vs. not rebalancing	Net buying share (%)
Age (in years)	-0.002***	-0.002***	-0.000	-0.106***
	(0.001)	(0.000)	(0.000)	(0.035)
Female dummy	-0.040***	-0.037***	-0.037***	0.010
	(0.014)	(0.012)	(0.011)	(0.761)
High school graduation	0.050***	0.029**	0.019*	0.266
(1=yes)	(0.015)	(0.013)	(0.011)	(0.817)
Normalized household	0.021***	0.016**	0.0093***	0.152
net income 2019	(0.008)	(0.006)	(0.003)	(0.838)
Normalized household	-0.000	0.000	0.000	-0.011
net wealth 2019	(0.000)	(0.000)	(0.000)	(0.011)
Willingness to take risk	0.011***	0.010***	0.007***	-0.168
2019 (0-10)	(0.003)	(0.003)	(0.002)	(0.199)
Children of pre-school or	-0.013	-0.010	0.002	-2.065*
school age	(0.016)	(0.013)	(0.012)	(1.059)
External childcare by	0.063	0.029	0.060	-1.773
institution / person	(0.042)	(0.032)	(0.037)	(2.748)
Income change during	0.008	0.009	-0.011	0.700
pandemic	(0.025)	(0.022)	(0.014)	(1.389)
Probability	0.000	0.000	-0.000	0.007
deadly disease	(0.000)	(0.000)	(0.000)	(0.015)
Probability	-0.000	-0.000	-0.000	-0.031
job loss	(0.000)	(0.000)	(0.000)	(0.0270)
Probability	-0.000	0.000	-0.001	0.061
financial problem	(0.001)	(0.001)	(0.001)	(0.059)
Probability	-0.000	-0.001*	0.000	-0.077**
liquidity dissave	(0.001)	(0.001)	(0.000)	(0.036)
Probability	0.001	0.0003	0.000	0.010
dissave	(0.000)	(0.0003)	(0.000)	(0.027)
Observations	1,660	1,607	1,570	1,670
Pseudo R^2	0.068	0.082	0.079	0.002

Note. Robust standard errors in parentheses. Marginal effects evaluated at mean from logistic regressions except net buy share (tobit). *** p<0.01, ** p<0.05, * p<0.1. Data are from SOEP-CoV and SOEP. Household net income is normalized by mean income. Household net wealth is normalized by mean net wealth. Net wealth is gross wealth minus debt. Willingness to take risk is from SOEP 2019 and increases from 0 to 10. Income change is 1 (increasing), 0 or -1 (decreasing). Probability items are fully described in Section 4.2; probabilities range between 0 and 100 percent.

4.4 Cross-sectional analysis of buying and selling

The analysis of buying and selling decisions reflects the portfolio share measure introduced in Section 3.2, analyzing each investor by the portfolio shares sold off or bought. While we have learned about characteristics of rebalancing individual investors, we now analyze determinants of buying and selling decisions separately (we cannot observe decisions about transactions of single assets at the aggregate portfolio level of each investor). In column 2 of Table 2, we again run a logit regression explaining net buying. We use the same RHS

variables as in column 1 and find, to put it in somewhat simplified terms, that the same set of variables explains net buying now as before rebalancing (Hanspal et al., 2021, also find that younger and higher-income US investors are more likely to be net buyers of stocks). This implies a clear distributional effect, as these investors, already better off due to better education and higher income, are now investing in a rising market; this latter decision further increases inequality, particularly wealth inequality (see also Bach et al., 2020).

In column 3, we again repeat the earlier regression to explain net selling and obtain a similar result but with two noteworthy differences: First, the coefficient on age turns insignificant, showing that sellers are not older than those who are not rebalancing. Second, the other explanatory coefficients are smaller than for buyers, cautiously indicating a lower relative degree of financial sophistication (see similarly Bucher-Koenen and Ziegelmeyer, 2014, for the financial crisis). Interestingly, the shock variables do not seem to be important here. The latter result is different for the United States, where negative income shocks are related to selling stocks (Hanspal et al., 2021). One reason for this cross-country contrast may be the generous German stabilization policy that buffered the degree of income losses and stabilized income expectations (see Schröder et al., 2020).

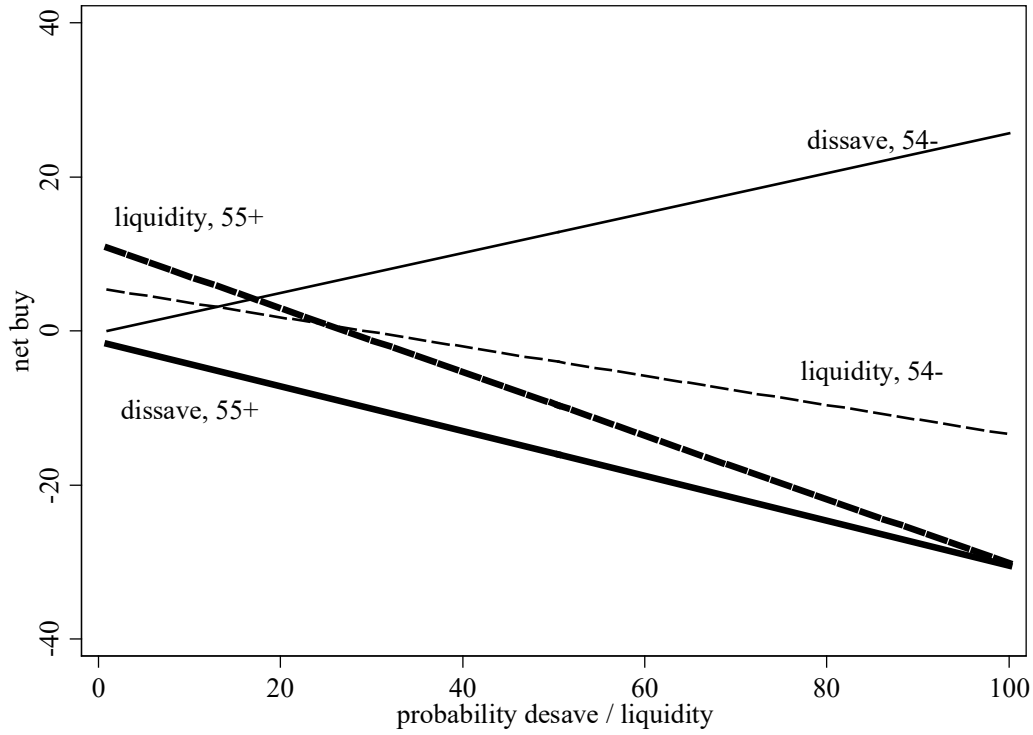
Finally, we look at the characteristics of investors who are net buyers during the Covid-19 crisis, which implicitly also tells us about the net sellers. Age is expected to make a difference, as older investors may tend to sell more quickly than younger ones; older investors are expected to be more concerned about illness and be hit harder by rare disasters, which are among the most important determinants for not holding risky assets (Choi and Robertson, 2020). Moreover, being hit by shocks should make a difference and partly explain net buying behavior. The results in column 4 of Table 2 indeed provide some confirmation of this expectation, as the age coefficient has the expected significant sign and one shock variable is also significant, that is, the expectation that the shock may lead to liquidity problems (i.e., inability to pay bills); moreover, investors with children at home tend to sell rather than buy risky assets during the crisis.

These three characteristics of individual investors may tell somewhat different stories: Older individuals face higher health risks, have less time to wait for market recovery, and may need their funds to cover living expenses during retirement (see also Coile and Milligan, 2009). Investors with children at home have less time available and may also need their funds to finance their children's education or to buy a home. Finally, (expected) liquidity concerns due to Covid-19 are a clear and direct consequence of the crisis. Despite these differences, in all

three cases, the crisis increases the riskiness of the individual (economic) situation quite directly; this may be interpreted as an individual consequence of increased background risk and thus support evidence of this theoretical channel.

Finally, we test whether two of the above three characteristics are interrelated – whether older investors reduce their risky assets in situations where they expect to be forced to use their savings. These situations are captured by two statements referring to the possibly expected consequences of the Covid-19 crisis (see Section 4.1): "have difficulties paying your bills and are forced to use your savings or take out loans" (liquidity) or "be forced to use your savings or liquidate your investments" (dissave). To keep a sufficient number of observations, we split the sample at the median age (up to 54 years vs. 55 and above) and run regressions of both shock variables explaining selling decisions. The resulting regression lines are shown in Figure 4.

Figure 4: The relation between dissaving expectations and net buying, depending on age



Note. All variables defined in Table 1. Bold lines: age segment 55 years and above; thin lines: age 54 years and below; solid lines: probability of dissaving ("forced to use … savings or … investments"); dashed lines: probability of being liquidity-constrained ("difficulties paying your bills"). To rebalance respondents in age group 55 and above, the OLS regression coefficient for the probability to dissave is -0.290 and -0.413** for the probability of being liquidity-constrained. To rebalance respondents in the age group 54 and below, the respective regression coefficients are 0.260 and -0.190. Database is SOEP-CoV.

Bold lines refer to older investors and thin lines to younger investors; the full lines to the item "dissaves" and the dashed lines to "liquidity." While the small number of observations limits statistical significance, it appears that expected use of saving – and thus tentative selling of risky assets – is more relevant for the older investors.

5 A quantitative assessment of distributional impacts

While several implications of the Covid-19-shock and individuals' behavior on the wealth distribution have been described above, we now provide a rough quantitative assessment. As the SOEP wealth data do not tell us about the allocation of individual financial assets, we utilize data collected in the Panel on Household Finance (PHF) as presented by Deutsche Bundesbank (2019). The PHF provides detailed statistics about the holding of financial assets and debts, and allows in particular the disaggregation into risky and safe financial assets, as used throughout this analysis.

Table 3 shows the stylized fact that holdings of risky assets increase with wealth. Holdings go from 0 percent in the bottom net wealth quantile (representing the 0-20 percent poorest households) to about 63 percent in the top wealth quantile (representing the 90-100 percent richest households). The respective mean holdings of risky financial assets increase from 0 euros to 118,000 euros per household (more information on these figures is given in Appendix Table A7). Interestingly, and at first sight counterintuitively, the relative share of risky assets to total assets (among risky asset holders) decreases with wealth. The reason is that richer households diversify their wealth by also holding real estate beyond owner-occupied housing and by holding business assets (see Bönke et al., 2019).

Based on this information, we can assess the impact of holding, selling, and purchasing risky assets during the Covid-19 crisis. As we do not have information about specific wealth portfolios, we have to make simplifying assumptions: As the starting price level in early 2020, we assume a DAX level of 13,000; as DAX level during the early phase of the crisis when most selling occurred, we take 10,000; as short-term holding period we take June 2020 with a DAX level of about 12,000; as long-term holding period we take the end of March 2021 with a DAX level of about 15,000. Further, assuming that rebalancing investors sold or purchased about 25 percent of their risky assets (see Table 1), the resulting losses between the beginning of 2020 and the early phase of the pandemic are 23 percent, while the gains from buying early and holding longer-term are 50 percent. For the median household with a net wealth of 73,000 euros,

these changes imply a loss of 965 euros or a gain of 2,097 euros. For a household in the top bracket, losses and gains are 6,800 and 14,800 euros, respectively. The results lie in between the outcomes for those who did not do anything: Their risky assets lost about 8 percent during the first half of 2020 and gained 25 percent up to the end of March 2021.

Table 3: Gains and losses along the net wealth distribution

Net wealth quantile	Gross wealth (€) - mean value	Net wealth (€) - mean value	Population share with risk assets (%)	Risky assets - conditional mean (€)	Loss (€): selling 25% with price loss of 23%	Gain (€): buying 25% with price gain of 50%
0 to 20	9,600	-6,800	0	0	0	0
20 to 40	18,800	13,300	7	5,686	327	711
40 to 60	99,400	73,400	22.5	16,778	965	2,097
60 to 80	258,000	222,100	27	25,715	1,479	3,214
80 to 90	476,400	436,400	50	47,328	2,721	5,916
90 to 100	1,381,500	1,292,100	63	118,205	6,797	14,776

Note. Data about the wealth distribution of households in Germany and their characteristics from Deutsche Bundesbank (2019) and own calculations.

By construction, these mean figures underestimate the dynamics among risky asset holders at the ends of the distribution. Most risky assets are held in the top 20 percent of the household net wealth distribution, and while they are a common asset for this group, the average share of total wealth is only about 10 percent. Still, there are households holding much larger shares of risky assets, and there are young, well-educated investors in the middle of the wealth distribution with large shares as well. At the same time, there are older investors hit by the Covid-19-shock who sold larger shares of risky assets than 25 percent. Thus, whether someone has to sell risky assets during the pandemic or is able and willing to buy (i.e., to shift wealth out of safe into risky assets) may make a huge difference. Taking the case of the median household above, the difference between selling and buying is more than 3,000 euros and equals 4.2 percent of net wealth. If a household holds twice this much in risky assets, this means that this difference becomes twice as large, and so on.

In the end, the resulting redistribution of wealth may be considerable and favors the young and well educated at the disadvantage of the older and others who are negatively affected by the Covid-19 crisis. Seen from a societal perspective, the distributional effects occur mainly in the upper half of the net wealth distribution in Germany, while the lower half of the wealth distribution – those with lower education and lower pay – are more often affected by job loss

or forced to shift from full-time to part-time work (see Adams-Prassl et al., 2020, and Schröder et al., 2020). In sum, these developments seem to contribute to an increase in inequality that may differ from the crisis of 2008/09 (see Grabka, 2016).

6 Conclusions

Our analysis of individuals' risky asset holdings in Germany indicates some sub-optimal decision-making during the early period of the Covid-19 crisis, at least seen from an *ex post* perspective. Generally, individual investors rebalanced their portfolios very little: In the beginning, almost 94 percent do not react at all. In contrast, investors react much more often after the recovery has started and shown some evidence of market stabilization. However, a large number of individual investors does not act at all, or takes little action, or delayed action.

There is a relatively small group of informed investors who consistently buy risky assets from April through June 2020. Due to the contemporaneous, quite continuous upward trend of the stock market (and other markets for risky assets), these risky asset buyers benefit from the recovery on the stock market up to the end of June 2021. Those who sold risky assets therefore did not benefit from the recovery (net sellers are those with relatively low income and education, which increases inequality, see Palomino et al., 2020; Schröder et al., 2020). While we cannot say much about general motives of the sellers, some of their early sales seem to have a rational origin, as these investors believed that the Covid-19 shock would imperil their wealth. Driven by this expectation (whether right or wrong), the sale of risky assets contributed to keeping the value of financial assets constant. There are the three characteristics representing types of individuals who are net sellers of risky assets: They are older, have children at home, or are concerned about liquidity shocks, that is, they are age-, time-, or liquidity-constrained. Unfortunately, being older implies a higher Covid-19-related health risk, young children can create a time burden for parents working at home, and a liquidity shock is undesirable in and of itself. This means that these individuals are impacted by Covid-19 directly, and also tend to lose in their decisions on risky asset holdings. Note that the latter follows from a rational reaction to unfavorable circumstances.

Summarizing our results with respect to the theoretical and empirical expectations mentioned in the introduction, we find partial support for all three of them: The initial phase in our sample is characterized by inaction of individual investors, a stylized fact in household finance that may be rationalized by high uncertainty and high transaction costs to act. Inaction is relieved by heavy buying, which is in line with standard portfolio theory. Finally, increased

background risk cannot explain the average rebalancing decisions but explains part of the selling decisions we observe. Thus, all three approaches seem to be helpful but none of them is consistent with the full evidence.

The resulting distributional consequences – regarding our sample of individuals holding risky assets, comprising mainly upper segments of the total population – point in two directions: The better informed investors profit relative to others, while older investors, investors with young children, and shocked investors lose relative to others. In this sense, holdings of risky assets reinforce the consequences of macroeconomic risk with their redistribution of wealth.

This suggests two different policy lessons. First, when aiming to learn from net buyers who benefitted from the recovery on the stock market, policy cannot change individual traits (such as risk tolerance). As a result, policy should focus on the longer term by raising the level of financial understanding through financial education (see, e.g., Lusardi and Mitchell, 2014); this may contribute to a higher share of investors rebalancing. As a secondary longer-term measure, policy can facilitate the access of individual investors to portfolios of well-diversified risky assets, which reduces the need for these investors to actively manage their portfolios themselves. Second, regarding the net sellers who did not benefit from the recovery, German stabilization policy during the early phase of this crisis was quite effective as can be seen from the (expected) income and job losses, which are moderate given the economic downturn. This stabilization largely prevented the need for fire sales by individual investors, but still some constrained investors may have felt forced to sell at low prices. If sellers' decisions followed from their expectations and risk preferences, this might be fine; if they were misguided and driven by feelings, financial education might contribute to reducing such behaviors. Finally, the large fluctuations in risky asset prices suggest some caution regarding a realignment of pension systems with a shift in the relative importance of statutory pay-as-you-go to privately funded pension plans.

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Online Appendix to

Risky asset holdings during Covid-19 and their distributional impact: Evidence from Germany

Table A1. Characteristics of the samples

	All		Risky assets		No risky assets		
Variable	Mean	SD	Mean	SD	Mean	SD	t stat.
Holding risky assets (1=yes)	0.282	0.450	1	0	0	0	
Age in years	53.737	18.384	56.150	17.717	52.660	18.524	-3.851
Female dummy	0.515	0.500	0.409	0.492	0.555	0.497	6.609
High school graduation	0.213	0.409	0.344	0.475	0.163	0.369	-9.286
Willingness to take risk (0-10)	5.075	2.338	5.134	2.113	5.062	2.419	-0.698
Household net wealth 2019	131289	716852	244204	1268815	87556	298085	-6.407
Household disposable income 2019	3134	1903	3909	2312	2840	1630	-12.188
Children of pre-school or school age	0.270	0.444	0.234	0.423	0.285	0.452	2.613
Childcare outside the home by institution / person	0.055	0.227	0.037	0.189	0.062	0.241	2.570
Income change during pandemic	-0.099	0.346	-0.103	0.325	-0.098	0.354	0.307

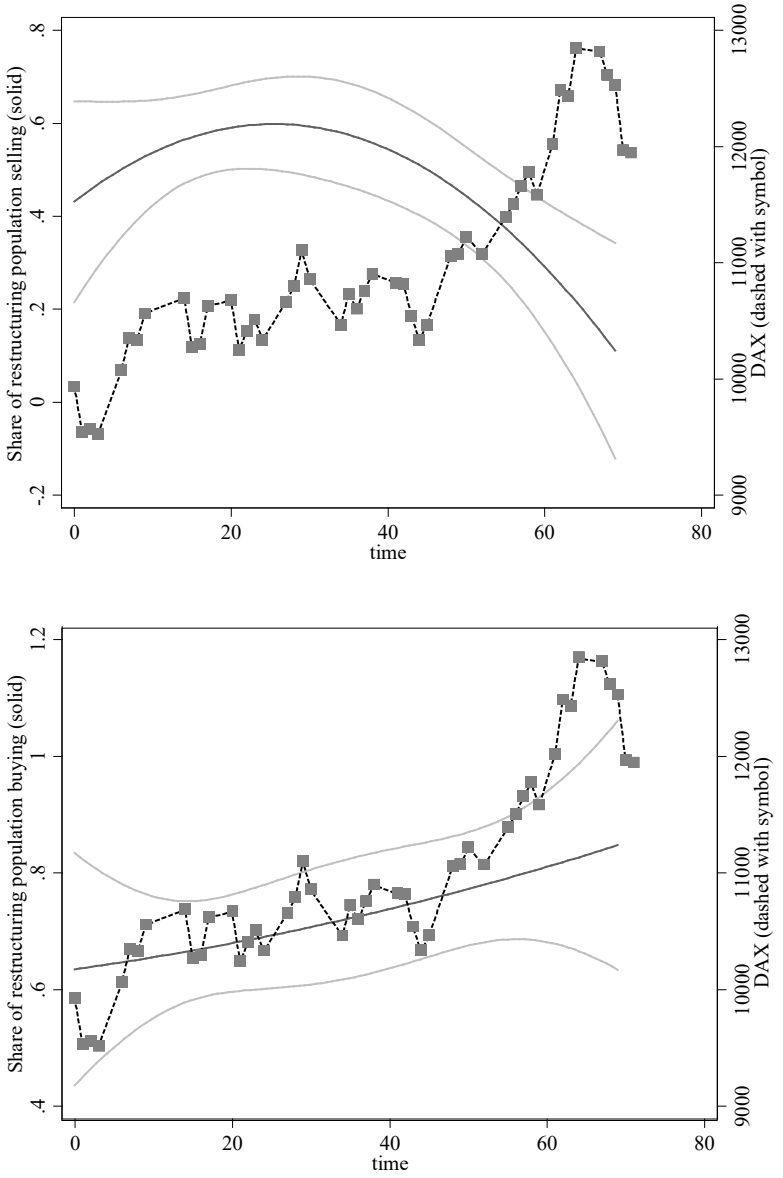
Note. Variables defined in Table 1 and Table 2. Weighted with individual weights. Children of pre-school or school age is a dummy (=1 if children are present). Childcare outside the home by institution / person is a dummy (=1 if childcare is available). Data are from SOEP-CoV and SOEP.

Table A2: Share of holders of risky assets in 2020 rises with wealth in 2019

Net wealth segment 2019	Percent of population holding risky assets
Below 50k euros	17.241
Between 50k and 100k euros	31.864
100k and 200k euros	36.076
200k euros and more	46.792

Note. Weighted with individual weights. Data are from SOEP-CoV and SOEP.

Figure A1: Selling and buying shares during the survey period



Note. Weighted with individual weights. Data are from SOEP-CoV. Time starts with first day of interviews (March 31).

Table A3: Means and measurement of six Covid-19 related items

Variable	Level of Measurement	Mean
Income change during pandemic	increase: 1, remained constant: 0, decreased: -1	-0.099
Probability deadly disease	0 to 100 percent	24.353
Probability job loss	0 to 100 percent	9.549
Probability financial problems	0 to 100 percent	7.153
Probability liquidity dissave	0 to 100 percent	8.091
Probability dissave	0 to 100 percent	14.907

Note. See also Table 1 for variable definitions. Weighted with individual weights. Data are from SOEP-CoV.

Table A4: Comparison of groups of investors

	Mean			t statistics			p values		
	Net sell	No realloc.	Net buy	No reall. vs buy	No reall. vs sell	Sell vs buy	No reall. vs buy	No reall. vs sell	Sell vs buy
Age	56.59	56.699	42.988	5.448	0.031	-3.22	0	0.975	0.001
Female dummy	0.143	0.426	0.245	2.403	4.911	1.113	0.016	0	0.266
Net wealth 2019	270327	246135	177661	1.504	-0.351	-1.237	0.133	0.726	0.216
Household net income 2019	4487	3849	4841	-3.107	-1.371	0.641	0.002	0.171	0.522
High school graduation	0.457	0.330	0.543	-2.341	-1.199	0.633	0.019	0.231	0.527
Willingness to take risk 2019	5.89	5.061	6.215	-3.333	-2.784	0.738	0.001	0.005	0.461
Children (pre-)school age	0.343	0.229	0.26	-0.375	-1.057	-0.614	0.708	0.291	0.539
Childcare outside the home by institution / person	0.074	0.037	0.019	1.263	-0.876	-1.266	0.207	0.381	0.206
Income change during pandemic	-0.05	-0.104	-0.118	0.231	-1.9	-1.053	0.817	0.058	0.292
Probability deadly disease	22.978	22.68	18.814	1.464	-0.064	-0.796	0.143	0.949	0.426
Probability job loss	6.782	6.447	6.339	0.048	-0.149	-0.147	0.962	0.881	0.883
Probability liquidity dissave	7.544	5.839	3.636	1.263	-0.567	-1.162	0.207	0.571	0.245
Probability fin. problems	3.233	3.215	2.049	1.094	-0.013	-0.742	0.274	0.989	0.458
Probability dissave	21.164	11.456	12.553	-0.191	-1.98	-1.156	0.849	0.048	0.248
Product of probabilities	0.006	0.193	0.001	1.874	1.82	-1.425	0.061	0.069	0.154

Note. All variables defined in Table 1 and Table 2. "Product of probabilities" is the product of the five probabilities (multiplied by 100). Weighted with individual weights. Data are from SOEP-CoV and SOEP.

Table A5: Restructuring decision with alternative specifications for inclusion of probabilities of Covid-19 related risks

Variable	Restructuring	Restructuring	Restructuring	Restructuring	Restructuring
Age	-0.002***	-0.0014***	-0.0016***	-0.0015***	-0.0015***
	(0.001)	(0.0005)	(0.0005)	(0.0005)	(0.0005)
Female dummy	-0.041***	-0.041***	-0.041***	-0.040***	-0.040***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
High school graduation	0.048***	0.049***	0.050***	0.048***	0.049***
	(0.015)	(0.015)	(0.016)	(0.015)	(0.015)
Normalized household net income in 2019	0.021***	0.022***	0.022***	0.022***	0.021***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Normalized net wealth in 2019	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Willingness to take risk 2019	0.011***	0.011***	0.011***	0.011***	0.011***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Childcare outside the home by institution / person	-0.013	-0.014	-0.013	-0.013	-0.014
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
Childcare outside the home by institution / person	0.063	0.063	0.063	0.063	0.064
	(0.041)	(0.041)	(0.041)	(0.042)	(0.042)
Income change in pandemic	0.013	0.007	0.010	0.012	0.0047
	(0.025)	(0.025)	(0.024)	(0.026)	(0.025)
Probability deadly disease			0.000		
			(0.000)		
Probability job loss				-0.000	
				(0.000)	
Probability financial problem					-0.000
					(0.001)
Probability liquidity dissave					-0.000
					(0.001)
Probability dissave					0.001
					(0.000)
Geometric mean of probabilities	-0.001				
	(0.001)				
Arithmetic mean of probabilities		0.000			
		(0.001			
Number of obs.	1,660	1,660	1,660	1,660	1,660
Pseudo R^2	0.066	0.066	0.066	0.066	0.068

Note. All variables defined in Table 1 and Table 2. Robust standard errors in parentheses. Marginal effects from logistic regressions. *** p<0.01, ** p<0.05, * p<0.1. Data are from SOEP-CoV and SOEP.

Table A6: Restructuring decisions for full sample, waves 1-3 and waves 4-6

Variables	All waves	Waves 1 to 3	Waves 4 to 6
Age	-0.002***	-0.001	-0.004***
	(0.001)	(0.001)	(0.001)
Female dummy	-0.040***	-0.043***	-0.035
	(0.014)	(0.015)	(0.036)
High school graduation	0.050***	0.035**	0.098**
	(0.015)	(0.016)	(0.038)
Normalized household net income 2019	0.021***	0.022***	0.0175
	(0.008)	(0.006)	(0.015)
Normalized household net net wealth 2019	-0.000	-0.000	0.005
	(0.000)	(0.000)	(0.006)
Willingness to take risk 2019	0.011***	0.011***	0.014
	(0.003)	(0.003)	(0.010)
Childcare outside the home by institution / person	-0.013	0.001	-0.026
	(0.016)	(0.018)	(0.044)
Childcare outside the home by institution / person	0.063	0.063	0.020
	(0.042)	(0.047)	(0.071)
Dummy change loss in pandemic	0.008	0.017	-0.040
	(0.025)	(0.029)	(0.053)
Probability deadly disease	0.0002	0.000	-0.001
	(0.000)	(0.000)	(0.001)
Probability job loss	-0.000	-0.000	0.000
	(0.000)	(0.000)	(0.001)
Probability financial problem	-0.000	-0.000	-0.002
	(0.001)	(0.001)	(0.003)
Probability liquidity dissave	-0.000	0.000	-0.008**
	(0.001)	(0.001)	(0.003)
Probability dissave	0.001	0.000	0.003**
	(0.000)	(0.000)	(0.001)
Observations	1,604	1,268	336
Pseudo R^2	0.068	0.072	0.109

Note. All variables defined in Table 1 and Table 2. Robust standard errors in parentheses. Marginal effects from logistic regressions except net buy share (tobit). *** p<0.01, ** p<0.05, * p<0.1. Data are from SOEP-CoV and SOEP.

Table A7: Input calculating gains and losses along the net wealth distribution

	Mutual funds		Shares		Bonds			Pop. share with risky assets		
Net wealth quantile	Part. rate	Cond. mean (€)	Part. rate	Cond. mean (€)	Part. rate	Cond. mean (%)	Exp. value (€) - all three assets	Max.	Min.	Average
0 to 20	0	0	0	0	0	0	0	0	0	0
20 to 40	6	4,700	2	5,800	0	0	398	8	6	7
40 to 60	17	13,500	9	13,400	2	13,700	3,775	28	17	22.5
60 to 80	19	23,700	12	16,400	4	11,800	6,943	35	19	27
80 to 90	34	41,000	26	28,400	6	39,000	23,664	66	34	50
90 to 100	39	79,100	36	93,700	12	82,400	74,469	87	39	63

Note. Data from Deutsche Bundesbank (2019) and own calculations.