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

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Abstract

This paper uses information from the Bundesbank Online Pilot Survey on Consumer Expectations (BOP) wave 8 and compares various mechanisms why households do not hold stocks, what prevents them from adjusting their portfolio, and what makes them overcome them. My results are results.

Keywords	equity premium puzzle - participation cost - adjustment costs - expectations - covid19
JEL codes	D14, G11, G5

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1 Introduction

Many theories to explain equity premium puzzle   The equity premium puzzle is not a new phenomenon, but a vibrant one. Household finance papers have tested empirically a variety of factors why households do not hold stocks at all and if they do, why such a small share of their portfolio.

This paper: high level summary   These factors are usually tested one by one using different time periods, locations, and reference groups which makes a comparison almost impossible. This paper uses data from the Bundesbank Online Panel (BOP) and asks around 2000 households to assess factors which played a role in their financial investment decision.

Contributions: The contributions of this paper are threefold. Firstly, I can compare the importance of many factors and assess how they correlate with each other. Secondly, while most papers focus on the participation part, I ask why households did not adjust their portfolio, or if they did what drove their decision. Lastly, I can link financial asset investment decisions with expectations about macro-variables.

My Results

1. No participation:
   - lack of information and interested most important, before risk factors
   - 3 components: risk aversion, lack of resources, no savings
   - first 2 lifecycle component, last income component

2. No Adjustment
   - Market is too risky/uncertain atm
   - 2 components: bad timing and lack of time
   - needs to get further attention

3. Bought
   - Good starting point or had a savingsplan in place
   - First time buyers: more time
   - Bought same asset type

4. Sold
   - cash out or rebalancing
   - some are driven out

5. Expectations

- Houseprices crowd out financial asset investments (Owner and renter)
- Higher inflation expectations reduces likelihood to buy

Why 2020? The year 2020 is an interesting time period to study. Due to covid-19 restrictions in March 2020, stock market prices plummeted by **X%** and recovered to **X%** by **XXXX**. Nevertheless, the overall participation rate increased. The DAI reports that 2.7 mio additional people held stocks compared to 2019. Here, the biggest increase (40%) was made for Germans younger than 40. **Add PAPI if ready**

Economic theory gives many explanations how this period impacts financial investment decisions. Firstly, **?** would argue that the vast decline in stock prices scares people away. Additionally, the path of recovery contains a lot of uncertainty. Do covid-cases decrease soon, will there be a vaccine available, or additional mutants which worsens the situation again? All this is reflected in the stock market, hence, **CAPM?** suggests that people would reduce their asset holdings.

On the contrary, the bufferstock model by **Carroll** suggests that higher uncertainty leads to higher savings. As background risks such as income risks increased as well, households would like to save to dampen possible shocks. Additionally, past experiences suggest that after a crash, there will be a recovery and hence, the crisis could mark a good opportunity to start investing. Lastly, covid affected everyday life in many dimensions. Consumption restrictions could have increased savings and free time for some households. Of course, this experience is extremely heterogeneous, as working remotely and home schooling increased not only the need for digital infrastructure, but also marked a huge burden on families with small children.

Data + Survey Methodology This richness of mechanisms makes it nearly impossible to identify each factor individually. Therefore, I ask respondents directly which factors played a bigger role and which did not in their decision process. The BOP asks a representative sample of 2000 German households on a monthly basis. Next to demographics and expectations of macro-variables as well as personal income or consumption dynamics, I included 5 to 6 questions for each respondent. They investigate the main drivers of financial decisions based on each type. Between March 2020 (the beginning of corona restrictions) and August (when the interview took place), respondents could have either i) not participated ii) not adjusted, iii) bought additional assets or iv) sold assets. Each type receives a set of questions where they need to rank each possibility.

Asking households directly are appealing in this context to compare the mechanisms, but have weaknesses. **ADD THEM HERE: PROS AND CONS**

Rest of Paper The rest of the paper is structured as follows. First, Section 2 summarizes drivers of financial decisions as well as household expectations. Afterwards, section 3 discusses the questionnaire as well as descriptions of the data. If you are just interested in results, you can forward to section 4. Lastly, section 5 assesses generality of the results and section 6 discusses them.

2 Literature Review

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

Equity Premium puzzle in general The equity premium puzzle describes the fact that the difference between stock market returns and riskfree rate cannot be explained with macroeconomic models using *reasonable numbers* for relative risk aversion parameters (See **???**).[1]. The equity premium puzzle is twofold. First, the low participation in the stock market and second, the relative low share of assets invested in the stock market (**?**). The literature can be grouped in three categories: risks, participation costs, and social interaction.

Risk One explanation focuses on risks of households. Especially, the correlation between labor income and stocks can limit participation (e.g., **Benzoni, Collin-Dufresne, and Goldstein (2007)) OTHER BACKGROUND RISKS SUCH AS HEALTH, HOUSING** When it comes to stock market volatility, **?** argue that experiencing macroeconomic shocks can have long lasting effects on financial risk taking behavior and find evidence in the US. A similar study by **?** uses European data confirms the results. Additionally, a macroeconomic shock can also increase uncertainty in the period after the shock occurred. Basic economic models argue that an increase in volatility, should decrease the savings households put in the stock market. **CAPM?**

Participation Costs Early models such as **? Haliassos and Michaelides (2003), and Gomes and Michaelides (2005)** impose a small participation cost to match empirical moments. As not everyone has the same resources, only a fraction of households will participate in equity markets. While direct costs such as setting up a brokerage account only makes a small part of it, a large literature explores indirect costs.

Information/Financial Literacy The first big bulk focuses on information costs. **?** uses the Survey of Consumer Financial Decisions and show 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 can consist of unawareness of financial products such as different stocks and funds and financial literacy. For the former **?** finds that soecioeconomic 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 increases the probability of stock market participation. Information issues appear through financial illiteracy. **?** show that many households lacking knowledge of basic principles. In an overview, they report that women are less financially literate – which leads to lower stock holding participation (**?**) – and higher educated are also more financial literate. Additional factors are ethnic/racial and regional differences. Several

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[1]The actual size depends on measurement, time and space (see**?** for a meta analysis)

papers show the strong link between financial literacy and stock market participation. For instance, **?** use Italian data, **??** Dutch and **?** German data.

no interest   Another factor is that households are not interested in the stock market. This "financial anxiety" or "financial phobia" (**?**) is an often overlooked factor. **?** show 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.

Time   Lastly, gathering information, making the decision, and implementing it takes time. **?** models it as a proportion of income to capture opportunity costs. **?** finds that time constraints play only a factor for 3% of nonparticipants in their sample.

Trust/Sociability/Peer Effect   Trust is studied by **?** who show that households with lower trust in other people are more afraid of being cheated on which lowers the expected payoffs from stock holdings. The second channel connects stock market participation with social interaction and peer-effects (e.g. **???**). The mechanism is that gaining information is costly and "word-of-mouth" communication can lower these costs (**?**). Another possibility is stated in **?** and argues that individuals have pleasure in discussing up and downs of stock markets as 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 (**??**, among others. Following **?** who uses the classification by **Durlauf and Fafchamps' (2004)**, the difference between the two is that interpersonal trust, sharing and reciprocity, while the latter focuses social networks or civic engagement.

Expected Return Beliefs and Stock Market Participation   The second class of literature focuses on expectations of traders/ households and their financial asset investments. **?** finds that participation increases monotonically with stock market expectations. **?** finds empirical evidence for retail investors and **?** shows that expected higher returns are very or extremely important by a quarter of all stock market participants.
   TBD: ADD OTHER PAPERS

Gap In the Literature   This paper contributes to three gaps in the literature. First, it compares magnitudes or importance of participation costs. Here, it is close to **?** who asks around 1000 household heads what their portfolio equity share determines. 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. Other papers such as **?** focus on wealthy investors
   Second, adjustment costs which need to be paid when changing the portfolio haven't received much attention even though they are crucial when matching not only participation, but portfolio shares invested in equity markets. **?** model them solely as a proportion of income, but do not give empirical evidence. In this paper, I ask households for reasons why they did not adjust their portfolio, as well as, why they adjusted it.

Thirdly, papers on expectations focus solely on expected stock market returns and stock market investments. Here, I shift attention towards stock market participation and other macro-variables such as inflation and house prices.

3 Data

The data source of this paper is the *'Bundesbank Online Pilot Survey on Consumer Expectations'*[2], which is a monthly survey conducted by the Deutsche Bundesbank since April 2020[3]. A representative sample of around 2000 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 wave 8 (August 2020), households were asked three to six questions regarding their stock market behavior[4]. Figure 1 shows the time line of the questions. Firstly, respondents are asked if they held any financial assets (stocks, bonds, funds, others[5]) actively in their portfolio prior 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 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 of their behavior, based on the literature summarized above. Individuals are asked to rank the reasons on a scale from 1 to 4 (strongly agree to strongly disagree)[6].

3.2 Expectation data

The BOP is rich in questions regarding consumer expectations.

1. Overview of Questions

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[2]This 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.
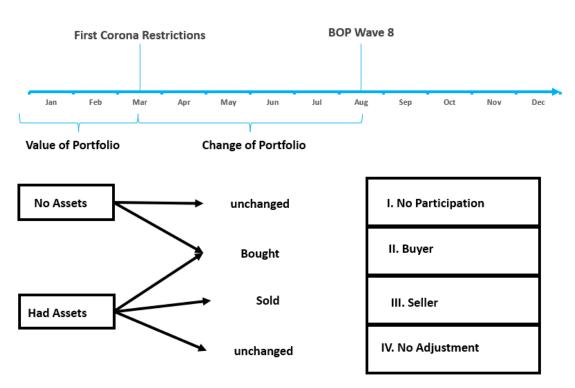
[3]The pilot phase covers the months April to June 2019, see **?** for details.

[4]The complete questionnaire can be found in the appendix **??** or at the Bundesbank website.

[5]The questionnaire contains info boxes about each asset type.

[6]The order of the answers are generated randomly for each respondent to avoid that scores depend on the order of question.

Figure 1 Time Line of the Questionnaire

2. My focus on Houseprices and Inflation

3. Types of questions

   - Qualitative: houseprice= mean rent and house prices; inflation = inflation...

   - Point estimate: winsorize.

   - Distribution: Expected mean + SD

Why do I use different versions: **?: document consensus modal forecasts of federal funds rate deviate from probability-weighted means in 2016**

?: extract model paths and probability-weighted means derived from the SPD dating back to 2011. Find significant skewness, blue chip lines up with modes, not probability-weighted means. Means have better forecast performance and less negative risk premia.

$\rightarrow$: chapter 1 of handbook

4 Results

Based on the questionnaire, five types can be categorized: no participation, no adjustment, bought (only), sold (only), bought and sold. Firstly, I will describe each type and alayze demographic drivers. Afterwards, I investigate the reasons for each decision. Here, I rank them and compare which factor is most important. Afterwards I conduct a principal component analysis to reduce factors and dig into heterogeneous drivers of each. Thirdly, I focus on the decision of buying and expectations.

4.1 Description of Types

This section summarizes statistics for each type and explores the underlying factors characterizing them.

Who bought/sold/unchanged, and how much? First of all, table 1 reports summary statistics for the different types.The first two columns show that around half of all respondents did not hold any financial assets which is slightly less than in the PHF and a quarter did have some in their portfolio prior March 2020, but did neither buy or sell any financial assets. Hence, one quarter or 497 individuals changed their portfolio between March and August 2020. ? calculate for the US using the PSID that almost 50% of all stock holders adjusted their portfolio within a two year span. Hence, this share has already adjusted their portfolio within 6 months. Arguably, 2020 was not a regular year and the turmoils on the stock market increased awareness to adjust the portfolio. GERMANY?! EUROPE?! COMPARISON Interestingly, about 18 % report, they only bought additional assets (column 3) where fonds and bonds were the most preferred asset types. Around 6 % sold some assets, and 4.4% bought and sold in the same time period.

Table 1 Summary Statistics of 5 types

		no participation (I)	no adjustment (II)	bought (only) (III)	sold (only) (IV)	bought and sold (V)
Total	%	50.1	25.4	18.0	2.1	4.4
	€			8,600	-17,300	3,200
	sd			(20,900)	(28,600)	(16,900)
Fonds	%			70.1	60.5	61.1
	€			3,400	-9,800	200
	sd			(10,600)	(17,500)	(5,100)
Bonds	%			43.7	37.2	84.4
	€			4,100	-4,600	3,500
	sd			(12,600)	(16,100)	(16,900)
Stocks	%			7.7	9.3	14.4
	€			200	-100	-200
	sd			(1,600)	(500)	(2,900)
Other	%			13.7	18.6	25.6
	€			800	-2,800	-400
	sd			(4,900)	(10,800)	(4,900)
n		1,013	513	364	43	90

Summary statistics of 5 types in the sample. This table shows how many of each group changed their portfolio in total and by asset type. Underneath the percentage of the population, the euro amount of the portfolio difference is reported with standard deviation in parentheses.

Table 2 Summary Statistics of 5 types (weighted)

		no participation (I)	no adjustment (II)	bought (only) (III)	sold (only) (IV)	bought and sold (V)
Total	%	55.1	23.0	16.1	1.9	3.9
	€			6,100	-11,800	1,200
	sd			(15,400)	(22,500)	(11,500)
Fonds	%			71.9	53.4	59.2
	€			2,700	-5,700	0
	sd			(8,600)	(11,900)	(4,500)
Bonds	%			44.3	41.9	81.4
	€			2,400	-3,300	1,700
	sd			(8,300)	(12,200)	(11,400)
Stocks	%			7.0	12.5	13.5
	€			100	-100	-300
	sd			(1,000)	(400)	(2,400)
Other	%			14.3	23.6	32.1
	€			900	-2,700	-300
	sd			(5,600)	(10,000)	(3,500)
n		1,013	513	364	43	90

Summary statistics of 5 types in the sample. This table shows how many of each group changed their portfolio in total and by asset type. Underneath the percentage of the population, the euro amount of the portfolio difference is reported with standard deviation in parentheses.

Heterogeneity in who bought/sold/unchanged Table 3 reports a demographic breakdown for each type and confirms multiple results from the literature. Characteristics such as college degree, male, higher income and home ownership increase not only the likelihood to hold financial assets, but to trade as well. Interestingly, younger households eg the cohort below 30 years, were more likely to buy than older. This is in line with reports such as Flossbach and Storch... documenting an increase in stock ownership among the young.

4.2 Reasons of behavior

In the previous section, we have seen that around 1,500 individuals did 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?*[7]

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. The third column shows the mean and the fourth column reports the mean of the standardized variable. The latter was constructed similar to **?**, where each answer is standardized using the average reported answer of all reasons per person and its standard deviation. The advantage is that each reason becomes more comparable as the standardisation takes care of the fact that the perception of 'agreement' might differ among participants. Additionally, observations where all answers receive the same score are filtered out.

While there is not one or two dominant reasons, a conglomeration of factors seem to be important. The two most important factors which are supported by around 70% of respondents and almost half say they fully agree are *lack of information* and *no 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. In contrast to **?**, where 'Wealth too small to invest in stocks' is the most important reason which is interpreted as 'participation costs'. By rephrasing it and asking about savings which could be invested in all sort of asset classes, a lack of such seems to to be less important.

Looking at the lower end of the scale, the shock of the stock market break due to covid-19, which would be in line with **?** is still for almost a quarter important, but seems not to play a predominant role. Similarly, costs such as bank fees and transaction costs and moral issues are only important for a small fraction of households.

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[7]The question reads: 'Why did you decide not to buy any asset(s) during the coronavirus pandemic?'

Table 3 Summary Statistics of 5 types

	total	no participation	no adjustment	bought (only)	sold (only)	bought and sold
	(I)	(II)	(III)	(IV)	(V)	(VI)
Female	41.5	47.7	43.7	28.0	30.2	20.0
Age						
<30	9.0	10.2	4.1	12.1	7.0	12.2
31-40	11.3	12.6	9.9	10.4	9.3	8.9
41-50	16.6	15.4	15.2	19.5	16.3	26.7
51-60	18.9	18.5	19.7	20.6	14.0	15.6
60+	41.4	40.3	48.5	35.2	46.5	35.6
HH Size						
1	24.7	25.7	22.8	23.4	34.9	24.4
2	45.3	45.0	48.9	40.9	39.5	47.8
3	12.8	12.4	10.7	16.2	9.3	16.7
4	12.5	12.1	12.3	14.6	9.3	10.0
5+	4.6	4.5	5.1	4.7	7.0	1.1
College	29.1	24.0	32.0	35.7	37.2	38.9
Employment						
full-time	42.7	38.6	38.4	55.5	51.2	56.7
part-time	11.7	13.7	11.3	8.0	4.7	8.9
retired	36.1	35.8	42.3	29.7	32.6	31.1
unemployed	9.6	11.8	8.0	6.9	11.6	3.3
HH income						
<1500	12.2	16.4	9.9	4.7	11.6	8.9
1500-3000	31.9	34.8	31.2	27.7	20.9	25.6
3000-5000	37.2	35.1	39.2	42.3	34.9	30.0
5000-8000	16.0	12.1	17.0	21.2	32.6	24.4
8000+	2.7	1.5	2.7	4.1	0.0	11.1
Owner	62.4	54.0	71.7	73.6	60.5	60.0

Summary statistics of the demographics of the total sample and the 5 types. This table shows the percentage of respondents in each type.

Table 4 Summary Statistics: Reasons No Participation

	Fully agree (I)	At least rather agree (II)	Mean (III)	Standardized (III)
information	50.52%	72.80%	3.25	0.58
no interest	47.49%	69.88%	3.17	0.47
distrust	37.99%	63.03%	3.00	0.27
too risky	34.77%	59.35%	2.88	0.17
no time	33.37%	57.89%	2.83	0.09
peer-effect	30.22%	51.31%	2.70	-0.08
no savings	30.32%	53.92%	2.73	-0.12
high valuations	17.52%	51.77%	2.61	-0.15
shock	23.91%	46.28%	2.53	-0.22
costs	19.95%	42.88%	2.44	-0.34
moral	16.27%	32.39%	2.17	-0.70

Summary statistics of reasons why households did not adjust their portfolio between March and August 2020. The first column reports the share of individuals who rated the reason 'fully agree', while the second column doe it for 'fully agree or '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.

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	information	0.40	moral	-0.60
shock	0.37	no time	0.40		
high valuations	0.35	no savings	0.34		
		shock	-0.33		

Caption

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 **??** and considering components with an eigenvalue of more than 1 as well as focusing on variables with a loading factor of more than 0.32.[8]

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 factor captures *lack of resources*. It consists of 'lack of interest', 'lack of information', 'lack of time', and 'lack of savings'. While the first component is about risk preferences which are not easy to change, this factor opens up the opportunity to increase stock holdings by focusing on these variables.

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.

In another step, a regression analysis evaluates driving factors of each component. For this, the mean value of all standardized variable is used to calculate the average value for each component. The resulting indicator is then regressed on demographics.

Table 6 shows that the first component or *risk aversion* increases with age, while the second one (*lack of resources*) has the opposite dynamic. Lastly, *no savings* depends on the work status and income level.

Summary & Interpretation: A result of this exercise is that many factors play an important role and can predict or explain why people do not participate in financial markets. Nevertheless, these reasons can be grouped into three big components which are driven by either a lifecycle pattern or by income levels. Hence, if someone wants to model stock market behavior, these mechanisms can be easily implemented.

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[8]The results do not change if rotated factors are used.

Table 6 Regression Table: Reason No Participation and Demographics

	(1) Risk Aversion	(2) Lack of Resources	(3) No Savings
1500-3000	-0.005	-0.010	-0.100**
	(0.048)	(0.047)	(0.045)
3000-5000	0.006	-0.044	-0.161***
	(0.049)	(0.045)	(0.045)
5000-8000	-0.028	-0.095	-0.263***
	(0.063)	(0.060)	(0.053)
8000+	0.014	-0.086	-0.191***
	(0.087)	(0.068)	(0.072)
31-40	0.078	-0.050	-0.055
	(0.058)	(0.062)	(0.050)
41-50	0.091	-0.073	-0.008
	(0.059)	(0.064)	(0.051)
51-60	0.167***	-0.078	-0.003
	(0.060)	(0.062)	(0.050)
60+	0.191***	-0.153**	-0.009
	(0.071)	(0.074)	(0.058)
Observations	906	926	917
Adjusted R^2	0.061	0.023	0.053
Controls	Yes	Yes	Yes

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

Additional controls are college, labor status, gender, children, home ownership

Data source: BOP Wave 8

Table 7 Summary Statistics: Reasons No Adjustment

	Fully agree (I)	At least rather agree (II)	Mean (III)	Standardized (III)
too risky	20.47%	55.52%	2.53	0.31
high valuations	9.47%	48.62%	2.39	0.09
no time	17.05%	49.39%	2.38	0.11
no savings	18.25%	42.20%	2.30	-0.06
peer-effect	17.24%	36.07%	2.12	-0.19
costs	10.67%	32.40%	2.09	-0.28

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 doe it for 'fully agree or '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.

4.2.2 Reasons No Adjustment

Next, I focus on individuals who held some financial assets, but did not buy or sell between March and August. These reasons refer more to 'adjustment costs', meaning the 'participation costs' are already paid, but these factors prevent them from investing *more*. Or rephrasing it, the question is *Why don't households adjust their portfolio?*

Table 8 reports the results. As a general note, the reasons in question did not score as high compared to the table above, where the most important reason had a mean of 3.25 compared to 2.53 here. Hence, while a large literature focuses on participation constraints, the question which reasons prevent individuals from holding larger shares in financial assets might need further attention. Are these the same or other factors which lead to non-participation?

What can be seen is that uncertainty and the risk of a downturn of the stock market prevented households to buy or sell any of their assets. These points seem understandable as volatility increased in the market due to covid and the stock market increased heavily between March and August. As even economists could only guess whether the economy would have a L,V,W or K shaped recovery, how should households know?

Interestingly, time constraints are similarly important. While ? argue that only 3% of his sample report that time issues play a role over a long period (he asks for participation over all without specifying a time period), choosing the 6 month span shows that household do argue that time constraints are important. Of course, this could be due to living in a pandemic, where home office and schooling puts an additional burden on households. Contrarily, households could also have more time on their hand due to restrictions on activities with friends (eating in a restaurant, meeting in a bar or going on vacations).

Table 8 Principal Component Analysis: No Adjustment

Comp 1 bad timing		Comp 2 lack of time	
too risky	0.63	no savings	-0.70
high valuations	0.58	peer effect	0.55
costs	0.49	no time	0.45

Notes

Principal Component Analysis   By conducting a PCA, two factors explain 60.20% of the variation. They divide the reasons why people did not adjust their portfolio in two groups. The first captures *bad timing*. It consists of 'high valuation', '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. Either because the market is too volatile or because costs or peer-effects prevent them.

The second factor captures *lack of time* and consists of 'lack of savings' (negative), 'lack of peers' and 'lack of time'. Here, the household might be willing to buy, but restricted resources prevent them.

Summary and Interpretation: Based on the findings, households waited to invest further either because they thought the timing is bad, or other obligations prevented them from allocating time into investment decisions.

4.2.3 Reasons bought

The first two paragraphs focused on what prevents households from holding any stocks or only to a limited amount. Now, we ask the question *What factors encourage households to purchase financial assets?*

Table 9 reports the answers to the question *'Why did you decide to buy the asset(s) after the coronavirus pandemic began?'* The picture is much clearer in this case, 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*. These insights can be easily implemented in economic models where a share of households save using savings plan with a fixed amount invested each period and households who actively take advantage of low valuations.

Table 9 Summary Statistics: Reasons Bought

	Fully agree (I)	At least rather agree (II)	Mean (III)	Standardized (III)
low valuations	38.74%	64.08%	2.79	0.90
plan	43.54%	62.07%	2.76	0.92
time	8.09%	26.59%	1.77	-0.07
information	7.60%	24.22%	1.70	-0.15
less consumption	3.88%	18.73%	1.58	-0.29
more income	4.33%	19.88%	1.57	-0.31
peer-effect	4.15%	13.87%	1.49	-0.36
bank fees	0.38%	3.52%	1.21	-0.65

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 doe it for 'fully agree or '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.

Looking at the lower end, additional time and information played for around a quarter of respondents an important role. These would be factors, policy makers could focus on increasing stock market participation rates. An increase in savings due either less consumption or more income led around 20% to a purchase of additional assets. Finally, peer-effects which have been focused on by many scholars, seems to be a rather less important factor for the average buyer and bank fees – eg actual costs of transaction – have a very small elasticity.

By focusing on household heterogeneity in table 10, we add a dummy for first time buyers and if the individual bought and sold as well to capture re-balancing effects. Additionally, the regression controls for labor status, gender, if the respondent has children living in the household and home ownership status. As they do not add any value, it is suppressed in the table.

Most variation can be captured by either an income or cohort effect. Column 1 shows that *low valuation* is more important for respondents with less than 1500 Euro monthly income, while having a *savings plan* or more savings due to *less consumption* has the opposite effect. For the cohort effect, the reasons *more time* and *peer effect* are more prominent for people below 30.

Interestingly, looking at first time buyers, having *more time* (column 3) is very important. This could explain the increase in stock holdings in Germany. Young households, who had more time on their hand started to invest.

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

Table 10 Regression Table: Reason bought and Demographics

	(1) low valuation	(2) savings plan	(3) more time	(4) more information	(5) less consumption	(6) more income	(7) peer effect
college	-0.070	0.104	-0.162	-0.052	0.035	-0.054	0.200**
	(0.123)	(0.152)	(0.103)	(0.112)	(0.085)	(0.087)	(0.090)
1500-3000	-0.802**	0.693*	0.094	-0.076	0.497***	0.174	-0.582*
	(0.316)	(0.377)	(0.266)	(0.375)	(0.159)	(0.282)	(0.340)
3000-5000	-0.593*	0.912**	0.139	-0.132	0.328**	-0.087	-0.513
	(0.330)	(0.404)	(0.270)	(0.374)	(0.147)	(0.270)	(0.338)
5000-8000	-0.237	0.510	0.145	-0.237	0.350**	0.089	-0.516
	(0.330)	(0.407)	(0.285)	(0.373)	(0.171)	(0.276)	(0.338)
8000+	-0.243	0.314	-0.133	-0.338	0.359*	0.108	0.132
	(0.359)	(0.433)	(0.285)	(0.419)	(0.205)	(0.306)	(0.368)
31-40	-0.192	0.315	-0.520***	0.154	0.001	0.263	-0.279*
	(0.216)	(0.253)	(0.170)	(0.239)	(0.167)	(0.177)	(0.148)
41-50	-0.250	0.646**	-0.379*	-0.142	0.006	0.117	-0.415***
	(0.169)	(0.252)	(0.194)	(0.181)	(0.137)	(0.145)	(0.137)
51-60	-0.551***	0.476*	-0.289	0.138	-0.026	0.157	-0.358***
	(0.195)	(0.273)	(0.206)	(0.210)	(0.140)	(0.157)	(0.138)
60+	-0.510*	0.542*	-0.256	0.430*	-0.233	-0.053	-0.390**
	(0.269)	(0.288)	(0.239)	(0.228)	(0.188)	(0.155)	(0.172)
first time	0.181	-0.871***	0.703***	0.043	-0.256**	0.370	-0.069
	(0.198)	(0.268)	(0.186)	(0.236)	(0.103)	(0.225)	(0.250)
bought & sold	0.510***	-0.961***	0.216*	0.454***	-0.165*	-0.024	0.035
	(0.132)	(0.172)	(0.130)	(0.171)	(0.093)	(0.095)	(0.099)
Observations	426	429	429	428	429	429	425
Adjusted R^2	0.099	0.193	0.139	0.056	0.054	0.034	0.170
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses
Dependent variable: Reason bought (standardized).
Additional controls are labor status, gender, children, home ownership
Data source: BOP Wave 8
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 11 Principal Component Analysis: Has Bought

Comp 1 additional resources		Comp 2 active vs passive		Comp 3 TBD?	
costs	0.57	plan	-0.69	less consumption	0.70
more income	0.51	low valuations	0.58	peer effect	0.67
information	0.49				
time	0.37				

Notes

Principal Component Analysis

Active vs Passive Buyers   Interestingly, the two reasons with the highest scores are part of the same component with opposite sign. Hence, respondents were either active or passive buyers. To dig deeper, I group everyone who reported a *savings plan* was an above average reason as *passive buyer*, while grouping everyone who does the same with *low valuation* and is not a passive buyer, as *active*.

Passive buyers: $287 \rightarrow 64\%$ Active buyers: $137 \rightarrow 30$ % Neither: $30 \rightarrow 6\%$

Next, I use a probit model to see which demographic characteristics determine active or passive buyers, as well as the other reasons for buying. Table 12 shows the results. The first two columns 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 people who rebalanced during the 6 month period.

Columns 5 and 6 show 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.

By Asset type   Table 13 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 asset type again. Additionally, the value held predicts a higher probability of investing in the same asset type. This at least holds true for fonds and bonds.

Summary and Interpretation:

4.2.4 Reasons sold

Lastly, we focus on the question *Why do households sell their financial assets?* As we have seen above, this group consists only of around 6% of households in the sample (N=133) which indicates that the results should be received with caution.

DON'T CONTRADICT YOURSELF HERE

Table 12 Regression Table: Active vs Passive buyers (Probit)

	(1) active	(2) passive	(3) active	(4) passive	(5) active	(6) passive
owner	0.501***	0.114	0.524***	-0.376**	0.513**	-0.466**
	(0.132)	(0.100)	(0.197)	(0.190)	(0.200)	(0.203)
young	0.522***	0.127	0.566**	-0.237	0.385	-0.193
	(0.170)	(0.136)	(0.244)	(0.249)	(0.253)	(0.270)
first time	1.721***	0.674*	0.741**	-0.956***	0.450	-0.642**
	(0.343)	(0.356)	(0.335)	(0.335)	(0.323)	(0.317)
bought & sold	1.639***	0.871***	0.680***	-0.825***	0.774***	-0.966***
	(0.202)	(0.184)	(0.208)	(0.208)	(0.223)	(0.223)
time					0.705***	-1.152***
					(0.126)	(0.135)
information					0.204*	-0.899***
					(0.121)	(0.128)
less consumption					0.211	-0.816***
					(0.169)	(0.166)
more income					0.407**	-1.110***
					(0.170)	(0.157)
peer effect					0.753***	-1.545***
					(0.169)	(0.171)
Observations	2022	2022	454	454	431	431
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses
Dependent variable: Active or Passive buyer.
Additional controls are education, labor status, gender, children
Data source: BOP Wave 8
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 13 Regression Table: Has bought by asset type (Probit)

	(1) Fonds	(2) Bonds	(3) Stocks	(4) Other
female	0.201	-0.116	0.502	-0.456
	(0.243)	(0.198)	(0.331)	(0.296)
owner	-0.719***	0.718***	-0.507	0.281
	(0.263)	(0.254)	(0.380)	(0.285)
has Fonds	2.462***	-0.697**	1.288**	-0.800**
	(0.320)	(0.328)	(0.567)	(0.396)
has Bonds	0.112	1.441***	0.520	0.016
	(0.344)	(0.264)	(0.389)	(0.379)
has Stocks	-0.285	0.204	2.179***	-0.072
	(0.378)	(0.389)	(0.395)	(0.483)
has Other	-0.341	0.894***	0.222	2.016***
	(0.330)	(0.323)	(0.423)	(0.338)
value fonds	0.112**	-0.086*	-0.140**	-0.011
	(0.047)	(0.051)	(0.069)	(0.057)
value bonds	-0.155**	0.202***	-0.033	-0.182***
	(0.063)	(0.051)	(0.073)	(0.066)
value stocks	0.025	-0.030	0.047	-0.028
	(0.080)	(0.079)	(0.067)	(0.105)
value other	-0.091	-0.146**	-0.192*	0.188***
	(0.064)	(0.061)	(0.113)	(0.070)
first time	0.515	1.065***	0.000	0.887*
	(0.413)	(0.374)	(.)	(0.459)
bought & sold	-0.443**	0.446	-0.572*	-0.159
	(0.224)	(0.275)	(0.330)	(0.305)
Observations	454	454	430	454
Controls	Yes	Yes	Yes	Yes

Standard errors in parentheses
Dependent variable: Has asset type.
Additional controls are income, age, children, labor status
Data source: BOP Wave 8
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 14 Summary Statistics: Reasons Sold

	Fully agree (I)	At least rather agree (II)	Mean (III)	Standardized (III)
high valuations	12.46%	40.94%	2.29	0.84
re-balancing	23.93%	44.36%	2.25	0.71
shock	6.83%	26.54%	1.79	0.15
too risky	6.96%	23.06%	1.72	0.06
need consumption	6.84%	17.60%	1.55	-0.17
need debt obligations	5.94%	13.38%	1.43	-0.31
no time	4.02%	11.68%	1.38	-0.35
peer-effect	0.25%	10.79%	1.34	-0.39
need support friends/family	1.60%	6.79%	1.23	-0.54

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 doe it for 'fully agree or '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.

Broadly speaking, the reasons can be split up in three groups based on their importance. Table 14 shows that around 40% of households either wanted to cash in their profits (or prevent further losses) and invest in other vehicles (*re-balancing*). The second group consists of individuals who are driven out of the stock market based on a mechanism of **?**, as the shock and the increased uncertainty played a major an important ole why they sold. Here, around a quarter stated that these reasons led to their decision. Lastly, a need for liquidity due to debt obligations or consumption played only a limited role over all. **?** show in a recent study that MPCs out of capital gains is relatively low (especially for not liquidity constraint households)[9]. .... OR: This could be interpreted as while economists treat financial assets and sight/deposit accounts equally liquid, households might tend to hold financial assets as a *'silver ware'* and sell them only in times of desperate need.

Principal Component Anaylsis   The principal component analysis confirms the interpretation. Table 15 indicates that four groups are important. The first one consists of factors related 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 *rebalanced*

Table 16 shows the underyling heterogeneity of the components from the PCA. Column 1 consists of variables about the crisis. The large negative correlation with *bought*

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[9]Using Swedish data, the authors show that MPCs out of dividend payments is around 23% for the bottom half of the wealth distribution. As I am asking solely of sells and hence, capital gains, my results are in line.

Table 15 Principal Component Analysis: Sold

Comp 1 Crisis		Comp 2 Lack of Resources		Comp 3 Social Component		Comp 4 Rebalancing	
too risky	0.59	need debt obligations	0.66	peer effect	0.75	rebalancing	0.94
shock	0.56	need consumption	0.65	need support friends and family	0.56		
no time	0.44						
high valuation	0.34						

Notes

Table 16 Regression Table: Reason sold and Demographics

	(1) Crisis	(2) Lack of Resources	(3) Social Component	(4) Rebalancing
college	0.089	-0.193**	0.108**	0.121
	(0.074)	(0.084)	(0.051)	(0.111)
kurzarbeit	0.182*	0.200	0.365***	0.238
	(0.107)	(0.266)	(0.105)	(0.234)
bought & sold	-0.115	-0.134	0.038	0.359***
	(0.082)	(0.083)	(0.058)	(0.104)
Observations	133	133	133	133
Adjusted R^2	0.092	0.133	0.112	0.175
Controls	Yes	Yes	Yes	Yes

Standard errors in parentheses
Dependent variable: Reason sold (standardized).
Additional controls are income, age, labor status, gender, home ownership
Data source: BOP Wave 8
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

& sold indicates that these respondents are scared away from the stock market. The second column indicates that respondents who need the money are more likely to be non-college graduates. The third column shows interestingly that *kurzarbeit* is important for having solds due to *peer effects* or *need support friends and family*. Lastly, *rebalancing* is obviously most important for respondents who bought as well.

4.3 Expectations and behavior

In this section, I want to capitalize other questions of the survey on expectations. Previously, we looked at the question *In case the household didn't participate/adjust or bought/sold assets, which demographics are determining the importance of each reason?* Now, we take a step back and look at *Why do households belong to each group?* While section 4.1 focuses on demographics, this section is dedicated to expectations of macro variables.

Most papers analyzed expectations of stock returns on stock holdings/trading (eg **??**). The BOP does ask for other variables such as economic growth, property prices or inflation in various ways. Respondents are asked to give qualitative statements, point estimates and probabilistic distributions.

I run probit regressions of the form:

$$y_i = \beta X + \gamma Z + \epsilon \tag{1}$$

where y_i is a dummy variable indicating if a person bought, X is a vector of controls capturing household demographics and Z contains expectations.

Results are twofolded. First, housing prices crowd out stock market investments and second, higher inflation expectations prevents households of buying.

Buying financial assets and house price expectations   Table 17 shows the regression results. The first three columns have qualitative statements. Here, respondents were asked if they expect houseprices or rents to decrease significantly, decrease slightly, stay roughly the same, increase slightly or increase significantly which translates to values 1-5. The first column takes the average of property prices and rent for all respondents. It shows that having a more optimistic outlook for housing prices, reduces the probability of buying by 20% points. This effect is similar for owners and renters (columns 2 and 3) and captures a crowding out effect for home owners/ expected higher rent payments for renter.

The remaining columns capture quantitative statements. Here, respondents were asked about a point estimate of house prices. After winsorizing at 95% the variable ranges from -5 to +30. Note here that the questionnaire asks about house price developments in the area of the respondent which justifies substantial heterogeneity. The output shows that stating an increase of 1% higher reduces the probability of buying financial assets by 2.6% points. Interestingly, here the effect is stronger for renters than owners.

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	-0.198*** (0.051)					
prop quali		-0.152*** (0.055)				
rent quali			-0.143* (0.080)			
house price wins				-0.026*** (0.008)	-0.011 (0.010)	-0.048*** (0.014)
Observations	2012	1257	755	1871	1171	700
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses

Dependent variable: Has assets bought.

Controls are income, age, gender, home owner, children, labor status, college

Data source: BOP Wave 8

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 18 Regression Table: Has bought and Expectations of Property Prices: Conditional on Participation (Probit)

	(1) All	(2) Owner	(3) Renter	(4) All	(5) Owner	(6) Renter
housing quali	-0.207*** (0.069)					
prop quali		-0.154** (0.068)				
rent quali			-0.108 (0.114)			
house price wins				-0.028** (0.011)	0.001 (0.013)	-0.081*** (0.020)
Observations	1006	713	293	949	675	274
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses

Dependent variable: Has assets bought.

Controls are income, age, gender, home owner, children, labor status, college

Data source: BOP Wave 8

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Buying financial assets and inflation expectations The second relationship connects expected inflation with the probability to buy financial assets. Previous literature shows that higher inflation can have a short-term negative impact on stock prices, but a possible positive ling term effect (eg **?**). Possible explanations of this relationship are that inflation or the response of central banks reduces the profitability if companies, an increase in risk which investors might not like, or failure of nominal price adjustments (Mogdiliani and Cohn, 1979).[10]

Table 19 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 qualitative statements of *interest of credit*, *inflation rate*, and *fuel prices*. All of them measure increases in prices to some degree. The results are similar to house price expectations and show that an increase in one category decreases the probability of buying financial assets decreases 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% (2) or even 10% (5). Column 5 and 6 only keep answers which range between 0 and 10% or 0 and 5% respectively. This is done so financial illiterate respondents who might state inflation increase by 80% do not drive the results.

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 massively.

Malmendier Handbook chapter: Inflation expectation: Strong evidence on influence on financial choices: homeownership (buy vs rent), mortgage borrowing, mortgage type (frm/arm)... Limited evidence on economic choices such as consumption, labor supply, wage negotiations

Kuchler Handbook chapter: House price expectation and buying

?: Households have 'supply side interpretation: 'inflation is bad for the economy' contrast to professional forecasters *Stagflationary view* (high inflation and high unemployment vs forecasters: Phillips Curve (Kamdar 2018)

5 Robustness

TBD

6 Discussion

Limitation

1. Random person from household. Doesn't have to be the head

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[10]See **?** for a discussion and empirical evidence for the latter reason.

Table 19 Regression Table: Has bought and Expectations of Inflation (Probit)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
inflation quali	-0.231***							
	(0.074)							
inflation PE wins		-0.100***	-0.099***	-0.095***				
		(0.019)	(0.019)	(0.020)				
fin illiterate: inflation > |30|			-0.363					
			(0.230)					
fin illiterate: inflation > |10|				-0.176				
				(0.217)				
0 < inflation < 10					-0.118***			
					(0.025)			
0 < inflation < 5						-0.146***		
						(0.034)		
inflation prob exp							-0.049***	-0.090***
							(0.017)	(0.020)
inflation prob sd								-0.582***
								(0.193)
Observations	2011	1873	1873	1873	1817	1655	1710	1710
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses

Dependent variable: Has assets bought.

Controls are income, age, gender, home owner, children, labor status, college

Data source: BOP Wave 8

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 20 Regression Table: Has bought and Expectations of Inflation: Cond on Participation (Probit)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
inflation quali	-0.268***							
	(0.101)							
inflation PE wins		-0.093***	-0.093***	-0.086***				
		(0.023)	(0.023)	(0.026)				
fin illiterate: inflation > |30|			-0.047					
			(0.335)					
fin illiterate: inflation > |10|				-0.263				
				(0.387)				
0 < inflation < 10					-0.121***			
					(0.030)			
0 < inflation < 5						-0.148***		
						(0.047)		
inflation prob exp							-0.080***	-0.103***
							(0.021)	(0.027)
inflation prob sd								-0.366
								(0.258)
Observations	1006	964	964	964	948	881	892	892
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses

Dependent variable: Has assets bought.

Controls are income, age, gender, home owner, children, labor status, college

Data source: BOP Wave 8

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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