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Trust and stock market volatility during the COVID-19 crisis

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ABSTRACT
We investigate if trust affects global stock market volatility during the COVID-19 pandemic. Using a sample of 47 national stock markets, we find the stock markets’ volatility to be significantly lower in high-trust countries (in reaction to COVID-19 case announcements). Both trust in fellow citizens as well as in the countries’ governments are of significant importance.

1. Introduction

The outbreak of the COVID-19 pandemic hit the world’s economy unprepared and led to uncertainty on global stock markets. While the increasing number of infections caused some governments to impose significant countermeasures, other governments such as the Swedish and the South Korean preferred a more relaxed policy without a lockdown. These different political reactions were heavily discussed in the public leading to the question whether governments took the right path. In this respect, Francis Fukuyama states in a recent article that the crucial determinant in overcoming the crisis is trust, and more specifically trust in the country’s government. As he puts it, “[...] trust is the single most important commodity that will determine the fate of a society. In a democracy no less than in a dictatorship, citizens have to believe that the executive knows what it is doing” (Fukuyama, 2020). But trust in governments might only be one side of the coin as trust in fellow citizens obeying the government’s orders might also be of significant importance (Goldstein and Wiedemann, 2020; Mehari, 2020).

In this paper, we therefore analyze whether societal trust (i.e. trust in anonymous others) and trust in the country’s government among citizens affect stock market volatility during the COVID-19 pandemic. The rationale behind being that societal trust and trust in a country’s government significantly reduce uncertainty among investors and therefore affect a stock market’s volatility. Using data from the World Values Survey to proxy for trust in a country and a sample of 47 national stock markets, we find stock markets’ volatility (in reaction to confirmed COVID-19 case announcements) to be significantly lower in high-trust countries. The results hold in univariate and multivariate tests as well as when using different proxies for trust.

Our paper contributes significantly to the existing literature. While most of the studies focus on the effects of the COVID-19 pandemic on specific stock markets (e.g. Al-Awadhi et al., 2020; Albulescu, 2020b; Ramelli and Wagner, 2020; Takahashi and Yamada, 2020), there are only a few studies analyzing the impact on global stock markets (e.g. Albulescu, 2020a; Engelhardt et al., 2020). In particular, Zhang et al. (2020) show volatility to be significantly larger in global markets due to the outbreak. Zaremba et al. (*) Corresponding author.
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N. Engelhardt et al. (2020) find the increase in return volatility to be related to policy responses. Our paper deepens the understanding by showing that trust affects a stock market’s volatility during the pandemic. Our study is also strongly related to Erdem (2020) who analyzes whether freedom in a country affects the stock market’s reaction to the announcement of infection numbers. He shows stock market returns in freer countries to be less negative and volatility to be lower in reaction to announcements of infection numbers. Finally, our study also relates to the impact of societal trust on financial markets in general. There are a few studies showing a relation between societal trust and an investor’s behavior (e.g. Adams, 2020; Georgarakos and Pasini, 2011; Lesmeister et al., 2018; Limbach et al., 2020).

The remainder of this paper is structured as follows: Section 2 describes the data and methodology. Section 3 presents the results of our empirical analysis. Section 4 provides robustness checks and Section 5 concludes.

2. Data & Methodology

We obtain daily data on confirmed COVID-19 cases per country from 22 January 2020 to 29 July 2020 from Johns Hopkins University and the closing prices of the corresponding lead stock market indices from Trading Economics and Yahoo Finance. This leaves us with an unbalanced panel since there were no officially reported cases in some countries until the beginning of March, 2020. Table A1 in the Appendix holds a list of countries covered. Following the existing economics literature (e.g. Guiso et al., 2010; Johnson and Mislin, 2012; Knack and Keefer, 1997; Sapienza et al., 2013), we obtain data on a country’s societal trust from the World Values Survey’s (WVS) latest wave (i.e. wave 7, 2017-2020). In line with Sapienza et al. (2013) and Lesmeister et al. (2018), we particularly focus on general trust within a society using the response to the question “Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?” We use the proportion of respondents answering with “most people can be trusted” as a score for societal trust. To account for trust in a country’s government among citizens, we use the response to the question “Could you tell me how much confidence you have in the government: is it a great deal of confidence, quite a lot of confidence, not very much confidence or none at all?” We construct a score for trust in the country’s government by adding the proportion of respondents answering with “a great deal of confidence” and the proportion of those answering with “quite a lot of confidence”. For both trust scores, we also construct a dummy variable indicating whether a country is a high-trust country. We define a country as a high-trust country if the country’s trust score is equal or larger than the 50th percentile of all trust scores.

To examine the impact of trust on stock market volatility during the COVID-19 crisis, we consider the following straightforward panel regression model, which is similar to the one in Erdem (2020):

\[
Market\ Volatility_{it} = \beta_0 + \beta_1 \times Cases\ growth\ rate_{it} + \beta_2 \times Trust\ dummy_{it} \times Cases\ growth\ rate_{it} + \epsilon_{it},
\]

where \( i \) is the country and \( t \) denotes the trading day, and \( \epsilon_{it} \) denotes the error term. Market Volatility\(_{it}\) is the 5-day moving average volatility calculated as

\[
\left( \frac{\sum_{t=1}^{5} (R_{it} - \overline{R})^2}{4} \right)^{1/2}
\]

and the COVID-19 growth rate is calculated as

\[
Cases\ growth\ rate_{it} = \ln(\frac{Cases_{it}}{Cases_{it-1}})
\]

where Cases is the number of confirmed COVID-19 cases in country \( i \) per million inhabitants at time \( t \). We define the variable Trust dummy as mentioned above.

Table 1 provides descriptive statistics for our sample consisting of 47 countries. In Panel A, we report descriptive statistics for the entire sample period ranging from 22 January 2020 to 28 July 2020. Mean volatility with a standard deviation of 1.48% is 1.78% and the mean growth rate of confirmed COVID-19 cases is 5.11%. The mean societal trust score is 31.09, while the mean trust in government score is 39.31. 64.04% of observations are classified as high-trust countries considering societal trust and 50.85% of observations are classified as high-trust countries considering trust in government. In Panel B, we report descriptive statistics for a subsample, where we specifically focus on a shorter time period where stock markets reacted strongly to the COVID-19 pandemic (Ramelli and Wagner, 2020; Erdem, 2020). As expected, volatility is slightly higher amounting to 2.43% with a standard deviation of 1.81%. The mean growth rate of confirmed COVID-19 cases is also significantly higher reaching 9.63%. The statistics for the remaining variables are almost identical to those reported in Panel A.

3. Results

The main empirical question we aim to answer is whether trust affects stock market volatility (in reaction to case announcements) during the COVID-19 pandemic. The rationale behind this being that trust in a government’s actions during the pandemic as well as trust in fellow citizens obeying the government’s orders significantly reduces uncertainty among investors. Before turning to the formal regression specifications investigating this hypothesis, we consider simple univariate statistics first. Table 2 presents the results from these tests.

In Panel A, we report the results for the full sample period where we consider societal trust first. While the difference in mean volatility between high and low-trust countries is not statistically significant, we find the growth rate of confirmed COVID-19 cases to be significantly lower in high-trust countries compared to low-trust countries. In Panel B, we again consider societal trust using our subsample. The results show that stock market volatility is significantly lower in high-trust countries during the time period where stock markets reacted severely. We also find the growth rate of confirmed COVID-19 cases to be significantly lower in high-trust countries. In Panel C and Panel D, where we replicate the tests using our Trust in Government dummy, we also find support for our

1 We obtain the data on the closing prices of the stock market indices for Argentina and New Zealand from Yahoo Finance to enlarge our sample since we cannot obtain these from Trading Economics.
Table 1
This table reports descriptive statistics. In Panel A, we report descriptive statistics for our full sample consisting of 47 countries for the time period from 22 January 2020 to 28 July 2020. In Panel B, we report descriptive statistics for a subsample consisting of the same 47 countries for the time period from 22 January 2020 to 3 May 2020. The stock market data come from Trading Economics and Yahoo Finance. COVID-19 data come from Johns Hopkins University. Data on trust come from the World Values Survey’s (WVS) latest wave (i.e. wave 7).

Panel A: 22 Jan - 28 July 2020 (Full Sample)

| Variable                         | Observations | Minimum | Maximum | Mean   | Median | Std.  |
|----------------------------------|--------------|---------|---------|--------|--------|-------|
| Market Volatility                | 5479         | 0.0000  | 0.1312  | 0.0178 | 0.0138 | 0.0148|
| Cases growth rate                | 5479         | -11.1132| 2.0794  | 0.0511 | 0.0125 | 0.0330|
| Trust                            | 5479         | 4.2000  | 73.9000 | 31.0891| 26.6000| 19.7591|
| Trust in Government              | 5479         | 0.0000  | 1.0000  | 0.6404 | 1.0000 | 0.4799|
| Trust dummy                      | 5479         | 0.0000  | 1.0000  | 0.5085 | 1.0000 | 0.5000|

Panel B: 22 Jan - 3 May 2020 (Corona Crash)

| Variable                         | Observations | Minimum | Maximum | Mean   | Median | Std.  |
|----------------------------------|--------------|---------|---------|--------|--------|-------|
| Market Volatility                | 2543         | 0.0000  | 0.1312  | 0.0243 | 0.0193 | 0.0181|
| Cases growth rate                | 2543         | -11.1132| 2.0794  | 0.0963 | 0.0508 | 0.4817|
| Trust                            | 2543         | 4.2000  | 73.9000 | 31.8052| 27.7000| 19.4749|
| Trust in Government              | 2543         | 0.0000  | 1.0000  | 0.6685 | 1.0000 | 0.4708|
| Trust dummy                      | 2543         | 0.0000  | 1.0000  | 0.5305 | 1.0000 | 0.4992|

Table 2
This table shows the univariate analysis for the full sample consisting of 47 countries over the time period from 22 January 2020 to 28 July 2020 and the subsample consisting of the same 47 countries over the time period from 22 January 2020 to 3 May 2020. In Panel A (full sample) and Panel B (subsample), we consider societal trust. We classify a country as a high-trust (low-trust) country if the Trust dummy equals one (zero). In Panel C (full sample) and Panel D (subsample), we consider trust in a country’s government. We classify a country as a high-trust (low-trust) country if the Trust in Government dummy equals one (zero). To test for statistical significance, we perform a t-test. *, **, *** denote statistical significance at the 10%, 5% and 1% level.

Variable: Trust dummy

Panel A: 22 Jan - 28 July 2020 (Full Sample)

| Variable                         | High-Trust Country | Low-Trust Country | Difference |
|----------------------------------|--------------------|-------------------|------------|
|                                  | Observations       | Mean              | Observations | Mean | Difference |
| Market Volatility                | 3509               | 0.0179            | 1970        | 0.0176| 0.0003     |
| Cases growth rate                | 3509               | 0.0420            | 1970        | 0.0674| -0.0254***|
| Trust                            | 3509               | 41.9518           | 1970        | 11.7403| 30.2115***|
| Trust in Government              | 3509               | 44.3401           | 1970        | 30.3564| 13.9836***|

Panel B: 22 Jan - 3 May 2020 (Corona Crash)

| Variable                         | High-Trust Country | Low-Trust Country | Difference |
|----------------------------------|--------------------|-------------------|------------|
|                                  | Observations       | Mean              | Observations | Mean | Difference |
| Market Volatility                | 1700               | 0.0235            | 843         | 0.0260| -0.0024**  |
| Cases growth rate                | 1700               | 0.0801            | 843         | 0.1291| -0.0490**  |
| Trust                            | 1700               | 41.7295           | 843         | 11.7919| 29.9375**  |
| Trust in Government              | 1700               | 44.8345           | 843         | 31.5335| 13.3011***|

Variable: Trust in Government dummy

Panel C: 22 Jan - 28 July 2020 (Full Sample)

| Variable                         | High-Trust Country | Low-Trust Country | Difference |
|----------------------------------|--------------------|-------------------|------------|
|                                  | Observations       | Mean              | Observations | Mean | Difference |
| Market Volatility                | 2786               | 0.0169            | 2693        | 0.0187| -0.0019***|
| Cases growth rate                | 2786               | 0.0366            | 2693        | 0.0662| -0.0295***|
| Trust                            | 2786               | 39.4231           | 2693        | 22.4674| 16.9557***|
| Trust in Government              | 2786               | 54.9146           | 2693        | 23.1709| 31.7437***|

Panel D: 22 Jan - 3 May 2020 (Corona Crash)

| Variable                         | High-Trust Country | Low-Trust Country | Difference |
|----------------------------------|--------------------|-------------------|------------|
|                                  | Observations       | Mean              | Observations | Mean | Difference |
| Market Volatility                | 1349               | 0.0226            | 1194        | 0.0264| -0.0038**  |
| Cases growth rate                | 1349               | 0.0661            | 1194        | 0.1305| -0.0645***|
| Trust                            | 1349               | 39.1374           | 1194        | 23.5213| 15.6161***|
| Trust in Government              | 1349               | 55.3517           | 1194        | 23.5611| 31.7905***|
hypothesis as the difference in mean volatility between high and low-trust countries is negative and statistically significant using both the full sample as well as the subsample. Also, the mean growth rate of confirmed COVID-19 cases is found to be significantly lower in high-trust countries in both samples. Overall, this first set of results suggests societal trust as well as trust in a country’s government to be associated with lower stock market volatility during the COVID-19 pandemic. However, we caution that the results are only univariate.

We now turn to the results from our multivariate specifications which are presented in Table 3. In column 1, we show the results from our baseline model where the dependent variable is the stock market’s volatility. Independent variables include Cases growth rate and the interaction term between the variables Cases growth rate and Trust dummy. Additionally, we include country-fixed effects. Using the full sample, we find a positive and statistically significant coefficient on Cases growth rate implying that stock market volatility increases with an increase in the growth rate of confirmed COVID-19 cases. This is in line with Erdem (2020). However, more importantly, we find a negative and statistically significant coefficient on the interaction term between Cases growth rate and Trust dummy. This finding supports our hypothesis and implies stock market volatility in high-trust countries to exhibit significantly less increase when the growth rate of confirmed COVID-19 cases increases.

In column 2, we use the same model specification but additionally include time-fixed effects (based on months), while in column 3 we also include the interaction between country and time-fixed effects. In both columns, however, we find similar results as in column 1. Therefore, we can conclude that societal trust significantly damps an increase in stock market volatility for an increase in the growth rate of confirmed COVID-19 cases by at least 0.70 percentage points.

In columns 4 to 6, we replicate the model specifications but use the interaction between the variables Cases growth rate and Trust in Government dummy. Same as in columns 1 to 3, we find positive and statistically significant coefficients on the variable Cases growth rate as well as negative and statistically significant coefficients on the interaction term. This implies that trust in a country’s government among citizens also significantly damps an increase in stock market volatility for an increase in the growth rate of confirmed COVID-19 cases by at least 0.55 percentage points.\(^2\)

Moreover, it is noteworthy that in all specifications the increase in market volatility resulting from an increase in the growth rate of COVID-19 cases is almost completely offset in high-trust countries.\(^3\) As suggested by Fukuyama (2020), societal trust and trust in a country’s government might therefore be an important factor determining how investors expect countries to deal with the challenges resulting from the COVID-19 pandemic. Thus, trust has a significant impact on the level of uncertainty on financial markets.

Using the subsample period in unreported regressions we gain qualitatively similar results providing further support for the negative relationship between trust and stock market volatility during the COVID-19 pandemic.

4. Robustness

Although not reported for reasons of brevity, we perform several robustness tests to ensure the validity of our results. First, we perform Pooled OLS regressions, where we include the two main effects as well as the interaction term, and find qualitatively similar results. We also use the raw trust scores instead of our dummy variables and find similar results for both the full sample and the subsample, which indicates societal trust as well as trust in a country’s government to be associated with lower stock market volatility (in reaction to COVID-19 case announcements). Further, we use alternative specifications to classify the countries as high or low-trust countries. Specifically, we use the 90\(^{th}\) percentile as a cut-off level for high-trust countries. Again, we find qualitatively similar results. Additionally, we use the scores provided by the OECD to proxy for trust in a country’s government among citizens and find similar results when controlling for country and time-fixed effects and the respective interaction term. We also check whether the freedom scores used by Erdem (2020) are significantly positively correlated with our trust proxies. However, we find that the correlation between the two trust scores and the freedom scores is negative and rather weak. Therefore, freedom within a country and trust seem to be different channels influencing a stock market’s volatility during the COVID-19 pandemic. Overall, our battery of robustness checks further supports our previous findings.

5. Conclusion

The outbreak of the COVID-19 pandemic led to uncertainty on global stock markets and to a consequential increase in volatility. In this study, we analyzed whether societal trust and trust in a country’s government among citizens affect stock market volatility during the COVID-19 pandemic. Investigating a sample of 47 lead national stock market indices, we find the stock markets’ volatility to be significantly lower in high-trust countries (in reaction to COVID-19 case announcements). Both trust in fellow citizens as well as in the countries’ governments are of significant importance. The results hold in univariate and multivariate tests as well as when performing several robustness tests. As a possible explanation for this finding, we propose that trust in a government’s actions during the pandemic as well as trust in fellow citizens obeying the government’s orders significantly reduces uncertainty among investors. Therefore, the reaction to an increase in the number of COVID-19 cases is dampened.

\(^2\) To compare our models, we also calculate the Akaike Information Criterion (AIC) and find that models (3) and (6) perform best.

\(^3\) For each regression, we perform a t-test indicating that the two regression coefficients \(\hat{\beta}_1\) and \(\hat{\beta}_2\) are significantly different from each other. Thus, we can conclude that the sum of the two coefficients is also significantly different from zero, indicating that the overall effect of the two coefficients is positive. This means that stock market volatility increased during the COVID-19 pandemic.
CRediT authorship contribution statement

Nils Engelhardt: Conceptualization, Methodology, Software, Data curation, Writing - original draft. Miguel Krause: Conceptualization, Methodology, Software, Data curation, Writing - original draft. Daniel Neukirchen: Conceptualization, Methodology, Software, Data curation, Writing - original draft. Peter N. Posch: Conceptualization, Writing - original draft.

Appendix

Table A1
This table shows the global stock market indices used in this study. ISO codes for each country are reported. For each country, we select the closing prices of the stock market index which come from Trading Economics and Yahoo Finance, respectively. Our sample covers 47 countries of each economic region: East Asia and Pacific (11), Europe and Central Asia (26), Latin America and Caribbean (6), Middle East and North Africa (1), North America (1), South Asia (1) and Sub-Saharan Africa (1).

| ISO  | Country         | Market Index | ISO  | Country         | Market Index |
|------|-----------------|--------------|------|-----------------|--------------|
| ARG  | Argentina       | MERV         | JPN  | Japan           | NIKKEI 225   |
| AUS  | Australia       | ASX200       | KOR  | South Korea     | Kospi        |
| AUT  | Austria         | ATX          | MEX  | Mexico          | IPC          |
| BGR  | Bulgaria        | SOFIX        | MYS  | Malaysia        | FTSE KLCI    |
| BRA  | Brazil          | BOVESPA      | NGA  | Nigeria         | NSE 30       |
| CHE  | Switzerland     | SMI          | NOR  | Norway          | OSEAX        |
| CHL  | Chile           | IGPA         | NZL  | New Zealand     | NZX 50       |
| CHN  | China           | SSE          | NLD  | Netherlands     | AEX          |
| COL  | Colombia        | IGBC         | PAK  | Pakistan        | KSE100       |
| CYP  | Cyprus          | CSE          | PER  | Peru            | PEN          |
| CZE  | Czech Republic  | SE PX        | PHL  | Philippines     | PSEI         |
| DEU  | Germany         | DAX          | POL  | Poland          | WIG          |
| DK  | Denmark         | OMX20        | ROU  | Romania         | BET          |
| ESP  | Spain           | IBEX 35      | RUS  | Russia          | MICEX        |
| EST  | Estonia         | OMX Tallinn  | SRB  | Serbia          | BELEX15      |
| FIN  | Finland         | HEX25        | SVK  | Slovakia        | SAX          |
| FRA  | France          | CAC 40       | SVN  | Slovenia        | SBITOP       |
| GBR  | United Kingdom  | FTSE 100     | SWE  | Sweden          | OMX30        |
| GRC  | Greece          | ASE          | THA  | Thailand        | SET50        |
| HRV  | Croatia         | CROBEX       | TUN  | Tunisia         | TUNINDEX     |
| HUN  | Hungary         | BUX          | TWN  | Taiwan          | TWSE         |
| IDN  | Indonesia       | JCI          | USA  | United States   | DJIA         |
| ISL  | Iceland         | SE ICEX      | VNM  | Vietnam         | VNINDEX      |
| ITA  | Italy           | FTSE MIB     |      |                 |              |

Table 3
This table presents the results from panel regressions on our full sample consisting of 47 countries over the time period from 22 January 2020 to 28 July 2020. The dependent variable is the 5-day moving volatility of the index returns. Cases growth rate is the log growth rate of the confirmed COVID-19 cases per million inhabitants. The trust dummies equal one if the trust score of a specific country is equal or larger than the 50th percentile of the entire trust sample, or zero otherwise. All regressions include country-fixed effects. In columns (2), (3), (5), and (6), we also include time-fixed effects (based on months). In columns (3) and (6), we additionally include the interaction between time and country-fixed effects. Standard errors corrected for heteroskedasticity and clustered at country level are reported in parentheses. *, **, *** denote statistical significance at the 10%, 5% and 1% level.

Dependent variable: Market Volatility

|                  | (1)       | (2)      | (3)       | (4)       | (5)       | (6)       |
|------------------|-----------|----------|-----------|-----------|-----------|-----------|
| Intercept        | 0.0166*** | 0.0175***| 0.0000*** | 0.0163*** | 0.0175*** | 0.0000*** |
| (0.0002)         | (0.0001)  | (0.0000) | (0.0002)  | (0.0001)  | (0.0000)  |
| Cases growth rate| 0.0460*** | 0.0106** | 0.0073**  | 0.0427**  | 0.0101**  | 0.0585**  |
| (0.0064)         | (0.0056)  | (0.0035) | (0.0059)  | (0.0042)  | (0.0025)  |
| Cases growth rate × Trust dummy | -0.0415*** | -0.0101** | -0.0070** | -0.0393** | -0.0098** | -0.0055** |
| (0.0066) | (0.0057) | (0.0035) | (0.0060) | (0.0043) | (0.0025) |
| Observations     | 5479      | 5479     | 5479      | 5479      | 5479      | 5479      |
| Countries        | 47        | 47       | 47        | 47        | 47        | 47        |
| Estimation method| OLS       | OLS      | OLS       | OLS       | OLS       | OLS       |
| Country FE       | yes       | yes      | yes       | yes       | yes       | yes       |
| Time FE          | no        | yes      | yes       | yes       | yes       | yes       |
| Country FE × Time FE | no       | yes      | no        | yes       | no        | yes       |
| R-Squared        | 0.0860    | 0.0071   | 0.0032    | 0.1043    | 0.0091    | 0.0030    |
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