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Does employee stock ownership program reduce a company's stock volatility during the Covid-19 lockdown?

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We examine whether the ESOP (employee stock ownership program) has a significant effect on a company’s stock volatility during the Covid-19 lockdown. We find that although banks’ stock prices were more volatile in response to the rise of covid-19 confirmed cases, banks with ESOP showed significantly lower volatility than banks without ESOP. To identify the causal effect of the ESOP implementation, we use the ESOP-culture-index of each country as an instrumental variable.

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1. Introduction

In this paper, we examine how employee stock ownership programs (ESOP) affected the stock volatility of banks during the Covid-19 lockdown.

The question of how Covid-19 impacts firms with employee stock ownership programs has gained increasing attention, prompting considerable discussion about whether ESOP can help to mitigate the impact of event risk. On the one hand, although there is no existing paper examining the impact of ESOP on a firm’s stock volatility during the lockdown, one can extrapolate from existing studies that, stocks of firms with ESOP should show higher volatility. First, Blasi et al. (2010), Pendleton and Robinson (2018), and Kruse et al. (2019) argue that employee share owners may be at substantial risk from having their economic resources excessively concentrated in one asset. According to the prospect theory, people decide about outcomes based on a reference point (reflecting their status quo) rather than based upon some “objective” final situation or status. As a result, different attitudes towards risk will emerge when a person perceives gains relative to their reference point or losses relative to their reference point and that people will care more about potential losses than potential gains (Blasi et al., 2010). Since the pandemic leads to a sudden shrinking income, coupled with a higher unemployment risk that puts employee-shareholders’ future wealth into great uncertainty, the employee-shareholders’ status quo is therefore heavily influenced by the dim prospect that if their company fails they will lose not only their jobs but also a potentially substantial amount of their wealth. This extreme sentiment of employee-shareholders will be promptly reflected through the volatility of stock prices (Chen et al., 2020; Narayan et al., 2021). Second, financial consulting firms and employee ownership associations also emphasize the impact of Covid-19 as a “subsequent event” that occurs after December 31, 2019 — the valuation date of most ESOP plans. This type of event is often reported in the valuation statements but are not reflected in the actual valuation. The basic principle behind granting ESOP is to align the interest of the employees with those of the long-term shareholders, and thus, ESOP shares are usually granted to employees at a discounted price relative to the price at the valuation date. As a consequence, a sharp fall in the stock price right after being granted can trigger an emotional reaction and an irrational action of employee-shareholders.

1 See some reports and discussions of financial consulting firms and employee ownership associations: https://www.nceo.org/covid-qa#_TocValuation https://www.huschblackwell.com/newsandinsights/esop-valuation-issues-during-the-covid-19-crisis https://www.southardfinancial.com/what-you-need-to-know-esop-and-community-bank-valuations-in-the-era-of-covid-19/.
On the other hand, there are arguments that during the lockdown, firms with ESOP should experience lower stock price volatility. Since Rosen and Rodgers (2014) and Kurtulus and Kruse (2017) show empirical evidence that companies with employee ownership tend to have higher survival rates and lower employment downturns in recessions compared to otherwise-similar firms without employee ownership, one can argue that the stock prices of firms with ESOP should be less volatile than others because the market is more confident about their survival after the crisis. In addition, a higher level of ex-ante transparency could strengthen shareholders’ and investors’ motivation to “stay with” instead of “running away” from the company when Covid lockdown suddenly occurs. According to the European Commission, ESOP can help to reduce firm risk by increasing information sharing, company transparency, and employee participation in decision making. When employees hold an ownership stake, they demand full transparency on companies’ accounts and decisions. Well-informed employees can make significant contributions to the effectiveness of company boards, especially their important function of monitoring and overseeing management (European Commission, 2014). Moreover, employee-shareholders can contribute to reduce firm risk-taking (Kolev et al., 2015) as they are risk-averse and have their job tied to the fate of their employer (e.g. Jensen and Meckling, 1976; Amihud and Lev, 1981). Consistent with these arguments, one can insist that because firms with ESOP maintain a higher level of ex-ante transparency as well as a relatively low level of risk tolerance, shareholders will have greater confidence in management’s ability to deal with event risk. Shareholders of firms with ESOP, therefore, will show less panic and over-reaction than shareholders of firms without ESOP.

In our study, we examine whether ESOP has a significant effect on a company’s stock volatility during the Covid-19 lockdown. We focus our investigation on banks rather than on non-financial firms for a reason. Because the impact of the lockdown varies across industries, the magnitude and speed of collapse in activity of firms differs according to business sectors. The operation of banks, however, is not directly affected by lockdown measures. Working on a sample of banks, therefore, alleviates concern about different levels of operational interruption of firms caused by lockdown measures.

We also chose to examine the banks of France, Italy, and Spain since these three countries experienced Covid-19 almost simultaneously and their responses were similar at the beginning of the pandemic. This specification will eliminate the concern of different levels of government reaction when one country can learn lessons from other countries to tailor their policies accordingly. We also narrow our focus to the first lockdown when the market had neither rational information nor adequate experience to forecast the future. Thus, the most important information that can shape investors’ sentiment during this period is the number of Coronavirus daily cases.

The crucial question to make sure our results are unbiased is to tackle the endogeneity issues pervading all empirical studies relating to aspects of corporate governance with firm risk (e.g., Hermalin and Weisbach, 1998; Adams et al., 2010). We consider that a potential reverse causality can exist between the ESOP implementation of a bank and its level of risk. We therefore use the ESOP-culture-index of each country as an instrumental variable for ESOP. The ESOP-culture-index is the score of political support and social dialog published in the table “the classification of European Union Member States based on regulatory density and support measures for employee financial participation of the European Commission” (European Commission, 2014) that measures the attitude of the government and social partners regarding ESOP of each country.

The rationale for this instrument is that a country’s culture and attitude regarding employee ownership will be mechanically correlated with the probability of a company having ESOP, but it does not depend on or is influenced by bank stock volatility. Moreover, we conduct IV tests to assess the empirical validity of our IV.

Using both ordinary least squares (OLS) regression estimates and the two-stage least squares (2SLS) regression model, we find that banks with ESOP have significantly lower stock volatility than banks without ESOP during the Covid-19 lockdown. Our result therefore supports the argument of the European Commission that ESOP can help to reduce firm risk. It is also consistent with the studies of Rosen and Rodgers (2014) and Kurtulus and Kruse (2017) that companies with employee ownership tend to have higher survival rates and lower employment downturns in recessions.

Our study contributes to an evolving literature on the effects of Covid-19 on stock market (see Mishra et al., 2020; Zhang et al., 2020; Haroon and Rizvi, 2020; Ali et al., 2020; Al-Awadhi et al., 2020; Ashraf, 2020; Narayan et al., 2021; Fernandez-Perez et al., 2021). Our paper is the first to evaluate the impact of ESOP implementation on a company’s stock volatility in case of event risk.

2 Data, variables, and sample

We extract all listed banks in three countries: France, Italy, and Spain available in the Bloomberg database. There are a total of 42 banks. We then compare these 42 banks with banks in the EFES (European Federation of Employee Share Ownership) database of 2019. We find that there are 25 banks having ESOP. We report a dummy variable (ESOP) taking the value of one if a bank has an employee ownership program; taking the value of 0 otherwise. We find that there is 59.52% of banks in our sample having ESOP. Table 1 shows a breakdown by country of banks with and without ESOP.

We extract the stock prices from the Bloomberg database. Our dependent variable is the stock return volatility (Volatility) that is calculated by the 5-day moving average volatility. We extract the daily 14-day cumulative number of reported Covid-19 cases per 100,000 population (Covid_Cases_Cumul_Growth) from the European Centre for Disease Prevention and Control for the period of the first lockdown of the three countries from 16/03 to 11/05/2020. As explained previously, we focus our analysis on the first lockdown in France, Italy, and Spain since these three countries experienced Covid-19 almost simultaneously and their responses were similar. As a consequence, the market had neither rational information nor adequate experience to forecast the future.

### Table 1

| Country | Number of banks with ESOP | % banks with ESOP |
|---------|---------------------------|-------------------|
| France  | 17                        | 5                 |
| Italy   | 17                        | 14                |
| Spain   | 8                         | 6                 |
| Total   | 42                        | 25                |

This table shows the country breakdown of banks with and without ESOP in the sample.

3 Appendix B reports the banks with/without ESOP in our sample. The Bloomberg database uses Ticker Equity to identify individual companies. Although 42 banks is the maximum number of listed banks of France, Italy, and Spain in the Bloomberg database, we also address the concern of sample selection bias in the robustness test in Section 5.

Table 1 shows that the proportion of banks having ESOP varies by country. It indicates that there may be time-invariant factors at the country level influencing the probability of a bank with ESOP. We take into account this issue by adding the country random effects specification in our regression models.

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3 Table 1 shows that the proportion of banks having ESOP varies by country. It indicates that there may be time-invariant factors at the country level influencing the probability of a bank with ESOP. We take into account this issue by adding the country random effects specification in our regression models.
future. This specification will eliminate the concern of different levels of government reaction when one country can learn lessons from other countries to tailor their policies accordingly.

We also extract financial data from the Bloomberg database to control for banks’ financial characteristics.

3. Endogeneity issues and estimation methodology

The endogeneity issues pervade all empirical studies relating to aspects of corporate governance with firm risk (Herermalin and Weisbach, 1998; Adams et al., 2010). In fact, the reverse causality between the ESOP implementation and firm risk could afflict our analysis due to the endogenous nature of corporate governance. Rosen and Rodgers (2014) and Kurtulus and Kruse (2017) show evidence that companies with employee ownership tend to have higher survival rates and lower employment downturns in recessions. In contrast, the level of firm risk can impact the decision of shareholders and managers in whether or not to adopt an ESOP. Therefore, we use the ESOP-culture-index as a instrumental variable for ESOP.

The ESOP-culture-index is the score of political support and social dialog published by the European Commission. The Commission (2014) used a score band4 to measure the attitude of the government and social partners regarding ESOP of each country. The score varies from 0 to 3. It equals 0 if neither government nor social partners are interested in ESOP. It equals 1 if there is only one social partner such as a professional association supporting ESOP. It equals 2 if social partners support ESOP, so ESOP can be seen as a part of social dialog. It equals 3 if ESOPs are a part of social dialog and are substantially supported by the government.

The conceptual premise for the relevance of the IV is that the attitude of the government and social partners regarding ESOP is mechanically correlated with the probability of a bank having ESOP, but it does not depend on or is influenced by bank stock volatility. Furthermore, Tran (2020) also shows empirical evidence that government support measures positively and significantly increase the proportion of European banks with ESOP.

We conduct two regression models to examine the impact of ESOP on stock return volatility during the Covid-19 lockdown. First, we run ordinary least squares (OLS) regression estimating the relationship between ESOP and stock return volatility during the Covid-19 period.

The equation for the OLS model is as follows:

\[
\text{Volatility}_{it} = \beta_0 + \beta_1 * \text{ESOP}_i + \beta_2 * \text{Covid}_i + \sum Control_i + \varepsilon_{ij}
\]

(1)

The equations of the first and second stage of the two-stage least squares (2SLS) regressions are as follows:

\[
\text{ESOP}_i = \beta_0 + \beta_1 * \text{ESOP} - \text{culture} - \text{index}_i + \beta_2 * \text{Covid}_i + \sum Control_i + \varepsilon_{ij}
\]

\[
\text{Volatility}_{it} = \beta_0 + \beta_1 * \text{Instrumented}_\text{ESOP}_i + \beta_2 * \text{Covid}_i + \sum Control_i + \varepsilon_{ij}
\]

(2.1)

The Instrumented ESOP in Eq. (2.2) is the predicted values of the ESOP in Eq. (2.1).

where Volatility is the 5-day moving average stock return volatility of the bank i, calculated as Volatility_{it} = \sqrt{\sum_{t=1}^{5}(R_{it} - \overline{R})^2}/4.

ESOP, is a dummy variable (ESOP) taking the value of one if the bank i has an employee ownership program, taking the value of 0 otherwise.

Covid\_Cases Cumul\_Growth is the Covid-19 growth rate. It is calculated as Covid\_Cases Cumul\_Growth = \ln(\text{Cases}_{t}/\text{Cases}_{t-1}) where Cases is the 14-day cumulative number of reported Covid-19 cases per 100 000 population. The 14-day cumulative number of reported Covid-19 cases is extracted from the database of the European Centre for Disease Prevention and Control. As previously explained, we argue that during the first lockdown when virtually all economic activities are in pause mode, the market had neither rational information nor adequate experience to forecast the future. Because the normal operations of banks are not directly affected by the lockdown measures, the volatility of banks’ stock prices is merely due to investors’ sentiment about the pandemic. Thus, the volatility of banks’ stock prices is expected to be significantly driven by the number of Coronavirus daily cases.

\[
\sum Control_i = \sum Control_i
\]

5 See https://www.ecdc.europa.eu/en/publications-data/download-todays-data-geographic-distribution-covid-19-cases-worldwide.

6 We follow the existing literature (La Porta et al., 1999; Claessens et al., 2000; Faccio and Lang, 2002) by using the controlling threshold of 20% of outstanding shares to distinguish between banks with and without controlling shareholders. If a bank has at least one shareholder who owns at least 20% of its outstanding shares, it will be classified as a bank with controlling shareholders.

7 We analyze the correlation coefficients between our control variables and find that all variance inflation factors (VIF) are smaller than 5 (see Appendix A). Thus, there is no serious multicollinearity problem in the model. Moreover, in Section 5. Robustness tests, we use orthogonalized values of Size, Growth, and Capital instead of actual values to show that our result is not due to a high correlation between control and explanatory variables.

4 See the table “the classification of European Union Member States based on regulatory density and support measures for employee financial participation of the European Commission” of The Promotion of Employee Ownership and Participation (European Commission, 2014).
Table 2
Definitions, data sources and summary statistics for variables.

| Variable name         | Definition                                                                 | Source                        | Min    | Max    | Median | Mean    | Std. Dev. |
|-----------------------|----------------------------------------------------------------------------|-------------------------------|--------|--------|--------|---------|-----------|
| **The dependent variable** | Volatility is the 5-day moving average volatility calculated as $\text{Stock Return Volatility}_t = \sqrt{\sum_{s=1}^{5} (R_s - \bar{R})^2/4}$ | Bloomberg database            | 0      | 0.12   | 0.03   | 0.04    | 0.03      |
| **The variables of interest** | ESOP is a dummy variable (ESOP) taking the value of one if the bank i has an employee ownership program, taking the value of 0 otherwise | EFES database                 | 0      | 1      | 1      | 0.59    | 0.49      |
| Covid_Cases_Cumul_Growth | The Covid-19 growth rate is calculated as $\text{Covid C/ases C/umul G/wrth} = \ln(\text{Cases}_i, t/\text{Cases}_i, t-1)$ where Cases is the 14-day cumulative number of reported Covid-19 cases per 100 000 population. | European Centre for Disease Prevention and Control\(^a\) | −0.10  | 0.21   | −0.01  | 0.01    | 0.08      |
| **The instrumental variable** | ESOP-culture-index measures the attitude of the government and social partners regarding employee stock option programs. The ESOP-culture-index varies from 0 to 3. It equals 0 if neither government nor social partners are interested in ESOP. It equals 1 if there is only one social partner such as a professional association supporting ESOP. It equals 2 if social partners support ESOP, so ESOP can be seen as a part of social dialog. It equals 3 if ESOPs are a part of social dialog and are substantially supported by the government (European Commission, 2014). In our sample, the ESOP-culture-index of France is 2; of Italy is 2; and of Spain is 1. | “The promotion of employee ownership and participation”, the European Commission (2014)\(^b\) | 1      | 2      | 2      | 1.81    | 0.39      |
| **Control variables** | Size is the natural logarithm of total assets | Bloomberg                     | 8.40   | 14.92  | 10.99  | 11.28   | 1.74      |
|                        | Growth is the growth rate of total assets | Bloomberg                     | 0      | 0.48   | 0.12   | 0.13    | 0.13      |
|                        | Capital is the total equity divided by total assets | Bloomberg                     | 0.03   | 0.18   | 0.06   | 0.09    | 0.04      |
|                        | Deposit is the total customer deposits divided by total assets | Bloomberg                     | 0.23   | 0.89   | 0.47   | 0.48    | 0.19      |
|                        | Operating is the total non-interest expenses divided by total operating incomes | Bloomberg                     | −18.20 | 14.32  | 2.72   | 3.06    | 4.48      |
|                        | d_Control is the dummy takes the value of one if the bank has at least one controlling shareholder; 0 otherwise. We follow the existing literature (La Porta et al., 1999; Claessens et al., 2000; Faccio and Lang, 2002) by using the controlling threshold of 20% of outstanding shares to distinguish between banks with and without controlling shareholders. If a bank has at least one shareholder who owns at least 20% of its outstanding shares, it will be classified as a bank with controlling shareholders. | Bloomberg                     | 0      | 1      | 0      | 0.48    | 0.50      |

\(^a\)See https://www.ecdc.europa.eu/en/publications-data/download-today-data-geographic-distribution-covid-19-cases-worldwide.

\(^b\)See the table “the classification of European Union Member States based on regulatory density and support measures for employee financial participation of the European Commission” of The Promotion of Employee Ownership and Participation (European Commission, 2014) https://op.europa.eu/en/publication-detail/-/publication/3077af3b-ecd4-11e5-8a81-01aa75ed71a1.

We estimate all regressions using country random-effects to control for possible within-economy correlations that could bias our analysis. The country random-effects specification, which is commonly used in the literature (Dahya et al., 2008; Durnev and Kim, 2005; La Porta et al., 2002; Claessens et al., 2002), explicitly allows for the correlated errors among the observations within a country and produces consistent standard errors. We use country random effects specification since it has been shown to be preferable to a fixed-effects one when a sample is made up only of a subsample of the total population of countries (Greene, 1997; Claessens et al., 2002; Durnev and Kim, 2005) as in our case, and moreover, bank financial characteristic variables remain constant throughout the analysis period, preventing the use of country-fixed effects.

4. Estimation results

Table 3 reports regression estimates models where the dependent variable is Volatility. Column 1 reports pooled ordinary least square (OLS) estimates. Column 2 reports OLS estimates for the model that includes country random effects and month fixed effects. Columns 3 and 4 report 1st and 2nd stage IV regression estimates obtained when ESOP is instrumented with the ESOP-culture-index.
Table 3

Does ESOP reduce stock volatility during Covid lockdown?

| Dependent variable: Stock return volatility |
|--------------------------------------------|
| (1) OLS                                     |
| (2) OLS                                     |
| (3) IV 1st stage                            |
| (4) IV 2nd stage                            |

|                          | (1)   | (2)   | (3)   | (4)   |
|--------------------------|-------|-------|-------|-------|
| ESOP                     | 0.00188* | 0.00236** |       |       |
|                          | (−1.66) | (−2.13) |       |       |
| Instrumented ESOP        |       |       |       | −0.0301*** |
|                          |       |       |       | (−4.18) |
| ESOP-culture-index       | 0.0301*** |       |       |       |
|                          | (7.60) |       |       |       |
| Cases_Cumul_Growth       | 0.172*** | 0.110*** | −0.150 | 0.0971*** |
|                          | (33.73) | (12.84) | (−1.41) | (9.21) |
| Size                     | 0.00469*** | 0.00482*** | 0.130*** | 0.00751*** |
|                          | (11.13) | (11.67) | (13.54) | (8.94) |
| Growth                   | 0.0119** | 0.0115** | 0.999*** | 0.0432*** |
|                          | (2.55) | (2.52) | (10.38) | (4.46) |
| Capital                  | −0.0524*** | −0.0496** | −1.339*** | −0.108*** |
|                          | (−2.60) | (−2.51) | (−3.10) | (−3.92) |
| Deposit                  | 0.0141*** | 0.0121*** | 0.379*** | 0.0137*** |
|                          | (3.77) | (3.32) | (4.27) | (3.18) |
| Operating                | 0.000500*** | 0.000494*** | −0.00841*** | 0.000358*** |
|                          | (5.22) | (5.28) | (−4.08) | (3.11) |
| d_Control                | 0.00258*** | 0.00276*** | 0.0814*** | 0.00455*** |
|                          | (2.92) | (3.18) | (4.36) | (4.09) |

Country random effects  No Yes Yes Yes
Month fixed effects No Yes Yes Yes
Observations 1722 1722 1722 1722

R-squared:
- Within 0.51 0.33 0.38
- Between 0.96 0.95 0.92
- Overall 0.51 0.53 0.45 0.41

IV F-stat 50.04
Anderson LM statistic p-value <0.01

This table reports regression estimates of models where the dependent variable is the 5-day moving average volatility of bank stock returns. Column (1) reports ordinary least square (OLS) estimates. Column (2) reports OLS estimates for the model with country random effects and month fixed effects. Columns (3) and (4) report 1st and 2nd stage IV regression estimates obtained when ESOP is instrumented with the ESOP-culture-index. All variables are as defined in Table 2. The T-statistics are in parentheses, with *, **, and *** denoting significance at 10%, 5% and 1% levels. Two identification test statistics are used. The first-stage F-statistic (IV F-statistic) tests if instruments are weak; if the IV F-statistic is smaller than 10, the instrument is weak. The Anderson canonical correlation LM statistic tests for underidentification, under the null hypothesis that excluded instruments are irrelevant.

Table A.1

Matrix of correlations between control variables.

|            | COVID_Cases_Cumul_Growth | ESOP | Size | Growth | Capital | Deposit | Operating | d_Control |
|------------|--------------------------|------|------|--------|---------|---------|-----------|-----------|
| COVID_Cases_Cumul_Growth | 1 |      |      |        |         |         |           |           |
| ESOP       | −0.0640** | 1 |      |        |         |         |           |           |
| Size       | −0.00500 | 0.513*** | 1 |        |         |         |           |           |
| Growth     | −0.0745** | 0.506*** | 0.317*** | 1 |         |         |           |           |
| Capital    | 0.0642** | −0.566*** | −0.653*** | −0.515*** | 1 |         |           |           |
| Deposit    | −0.101*** | 0.316*** | 0.0166 | 0.598*** | −0.548*** | 1 |         |           |
| Operating  | 0.00106 | 0.0484*** | 0.130*** | 0.119*** | −0.0789*** | −0.0715*** | 1 |           |
| d_Control  | −0.000600 | 0.00925 | −0.191*** | −0.0105 | −0.0645*** | 0.110*** | 0.0187 | 1 |

This table reports the correlation coefficients between independent variables. All variables are defined in Table 2. ***, and *** denote significance at 10%, 5% and 1% levels respectively.

On the one hand, the results confirm our expectation that the Covid-19 growth rate increases significantly (at 1% level) stock volatility of banks, consistent with existing studies about the effect of Covid-19 on the stock market (see [Mishra et al., 2020; Zhang et al., 2020; Haroon and Rizvi, 2020; Ali et al., 2020; Al-Awadhiet al., 2020; Ashraf, 2020; Narayan et al., 2021; Fernandez-Perez et al., 2021]).

On the other hand, the evidence in Table 3 shows that during the Covid-19 lockdown, stock volatility is negatively correlated with ESOP, independently of the model and specifications used for estimation.

The OLS estimates in columns 1 & 2 indicate that there is a negative relation between ESOP and stock volatility during the lockdown. However, these results still cannot eliminate concerns about the causal effect between ESOP and stock volatility that could distort the results.

Columns 3 & 4 in Table 3 report the results of the first- and second-stage IV estimates, respectively. The first-stage results show that there is a significant (at the 1% level), positive relation between the ESOP-culture-index and ESOP, consistent with our previous explanation that the attitude of the government and social partners regarding ESOP is mechanically correlated with the probability of a bank having ESOP. We report the first stage F-statistic on the instrument and the p-value related to the Anderson canonical correlation LM statistic for the relevance of the instrument. We verify that the F-statistics is greater than 10,
which passes the "weak instrument test", and that we can reject the null of the Anderson canonical correlation LM test. This result, therefore, confirms that our IV is empirically relevant.

The second-stage IV estimates of the relation between ESOP and stock volatility are in line with the OLS results. The results in column 4 prove that the ESOP implementation has a causal impact on stock volatility during the first Covid-19 lockdown. Banks without ESOP show a significantly higher volatility than banks with ESOP.

The results in Table 3 also confirm our expectation that stock volatility will be stronger for banks with larger size, higher asset growth, higher customer deposits and operating ratios, or with controlling shareholders, while it is less volatile for banks with a higher equity ratio.

5. Robustness tests

We perform several robustness tests to check the validity of our results.

Effect of size

Although we have control for bank size in all regressions, it remains a concern that larger banks are more likely to adopt ESOP than smaller banks, and thus, the relation between ESOP and volatility appears to be due to a spurious correlation between size and volatility. We, therefore, re-conduct our regressions using sub-samples that include banks with relatively smaller sizes.

To test whether your results are driven by larger banks, we first use a sub-sample including banks with a size smaller than the threshold at the 75th percentile of the sample. The means test show that the mean size of banks without ESOP is significantly lower than that of banks with ESOP for this sub-sample. The results in Appendix C still indicate that during the Covid lockdown, stock volatility is positively correlated with the growth rate of the Covid cases while it is negatively correlated with ESOP. Moreover, the IV test confirms the validity of the IV.

Moreover, we also use another sub-sample including banks with a size smaller than the threshold at the 50th percentile of the sample. Different from the previous sub-sample, the means test show that the mean size of banks without ESOP is significantly higher than that of banks with ESOP for this sub-sample. However, the results in Appendix D still confirm the robustness of our results.

Overall, this test shows that the relation between ESOP and volatility does not appear to be due to a spurious correlation between size and volatility.

Concern of sample selection bias

In spite of the fact that our sample includes all listed banks from the Bloomberg database, one still may be concerned that there is a sample selection bias since French banks include Credit Agricole S.A. and its 11 regional banks. Moreover, among them, only Credit Agricole S.A. implements ESOP. It also helps to explain why the ESOP-culture-index of France is relatively high, but the proportion of French banks with ESOP in the sample is relatively low.

We, therefore, test the robustness of our results by using a sample excluding French banks. The results in Appendix E show that our findings are unchanged when we use a sub-sample excluding French banks.

Orthogonalizing variables

Although the correlation coefficients analysis in Appendix A shows that all variance inflation factors (VIF) are smaller than 5, and thus, there is no serious multicollinearity problem in the model, one still can be concerned that high correlation among explanatory and control variables could lead to the bias results.

We orthogonalize Size, the growth rate of total assets (Growth), and the total equity divided by total assets ratio (Capital) with ESOP. We then re-conduct our analysis by using orthogonalized values of Size, Growth, and Capital instead of actual values. The results in Appendix F show that these specifications lead to similar results to our previous inferences.

6. Concluding remarks

This article attempts to explore the impact of ESOP on stock volatility during the Covid-19 lockdown. Using different regression models with alternative specifications, we show that although banks’ stock prices were more volatile in response to the rise of covid-19 confirmed cases, banks with ESOP showed significantly lower volatility than banks without ESOP.

There are two explanations for this result. First, because companies with employee ownership tend to have higher survival rates and lower employment downturns in recessions (Rosen and Rodgers, 2014; Kurtulus and Kruse, 2017), the stock prices of banks with ESOP should be less volatile than others because the market is more confident about their survival after the crisis. Second, companies with ESOP maintain a higher level of ex-ante transparency (European Commission, 2014) as well as a relatively low level of risk tolerance (Kolev et al., 2015), shareholders will have greater confidence in management’s ability to deal with event risk. Shareholders of banks with ESOP, therefore, will show less panic and over-reaction than shareholders of banks without ESOP. Our paper is the first to evaluate the impact of ESOP implementation on a company’s stock volatility in case of event risk.

Appendix A

See Table A.1.

Collinearity diagnostics

| Variable | VIF | SQRT-VIF | Tolerance | R-squared |
|----------|-----|----------|-----------|-----------|
| COVID_Cases_ | 1.01 | 1.01 | 0.9879 | 0.0121 |
| Cumul_Growth | 1.01 | 1.01 | 0.9879 | 0.0121 |
| ESOP | 1.78 | 1.33 | 0.5611 | 0.4389 |
| Size | 3.12 | 1.77 | 0.3209 | 0.6791 |
| Growth | 2.04 | 1.43 | 0.4906 | 0.5094 |
| Capital | 3.80 | 1.95 | 0.2630 | 0.7370 |
| Deposit | 2.80 | 1.67 | 0.3574 | 0.6426 |
| Operating | 1.06 | 1.03 | 0.9412 | 0.0588 |
| d_Control | 1.13 | 1.06 | 0.8851 | 0.1149 |

This table reports Variance Inflation Factor (VIF) which is used to detect the presence of multicollinearity between independent variables. If VIF is smaller than 5, there is no serious multicollinearity problem.

Appendix B

42 banks in the sample

| BankName | Ticker | Equity in Bloomberg | Country | ESOP |
|----------|--------|--------------------|---------|------|
| Banca Carige SpA | CRG | IM Equity | Italy | 1 |
| Banca Generali SpA | BGN | IM Equity | Italy | 1 |
| Banca IFIS SpA | IF | IM Equity | Italy | 1 |
| Banca Mediolanum SpA | BMEDIM | Equity | Italy | 1 |
| Banca Monte dei Paschi di Siena SpA | BMPSIM | Equity | Italy | 1 |
| Banca Popolare di Sondrio SCPA | BPSO | IM Equity | Italy | 1 |
| Banca Sistema SpA | BST | IM Equity | Italy | 0 |
This table reports the banks with/without ESOP in our sample. The Bloomberg database uses Ticker Equity to identify individual companies. There are a total of 42 listed banks of three countries: France, Italy, and Spain in the Bloomberg database. We compare these 42 banks with banks in the EFES (European Federation of Employee Share Ownership) database of 2019. There are 25 banks having ESOP.

### Does ESOP reduce stock volatility during Covid lockdown?

| Dependent variable | Volatility |
|-------------------|------------|
|                  | (1)        | (2)        |
| ESOP              | 0.0209***  | (-5.58)    |
| ESOP-culture-index | 0.478***   | (11.80)    |
| Cases_Cumul_Growth | -0.167     | (-1.21)    |
| Size              | 0.159***   | (9.61)     |
| Growth            | 1.254***   | (11.03)    |
| Capital           | -0.651     | (1.22)     |
| Deposit           | 0.452***   | (4.12)     |
| Operating         | -0.00124   | (-0.31)    |
| d_Control         | 0.125***   | (5.37)     |

Country Random Effects: Yes
Month Fixed Effects: Yes
Observations: 1312
R-squared: 0.04
Within: 0.38
Between: 0.99
Overall: 0.44
IV F-stat: 120.99
Anderson LM statistic: <0.01

This table reports regression estimates of models where the dependent variable is the 5-day moving average volatility of bank stock returns (Volatility). Columns (1) and (2) report 1st and 2nd stage IV regression estimates obtained when ESOP is instrumented with the ESOP-culture-index. All variables are as defined in Table 2. The T-statistics are in parentheses, with *, **, and *** denoting significance at 10%, 5%, and 1% levels. Two identification test statistics are used. The first-stage F-statistic (IV F-statistic) tests if instruments are weak; if the IV F-statistic is smaller than 10, the instrument is weak. The Anderson canonical correlation LM statistic tests for underidentification, under the null hypothesis that excluded instruments are irrelevant.
Appendix D

We conduct a robustness test using a sub-sample of banks with a size smaller than the threshold at the 50th percentile of the sample. The means test that compares the difference in the means of Size between the two groups of banks with/without ESOP. Significance levels are indicated by *, **, and *** and correspond to the 10%, 5%, and 1% significance levels, respectively.

| Total sample | Without ESOP | With ESOP | Difference (Without - With) |
|--------------|--------------|-----------|-----------------------------|
| Number of banks | 14 | 7 | 0.10*** |
| The means of Size | 9.90 | 9.80 | (0.00) |

Does ESOP reduce stock volatility during Covid lockdown?

| Dependent variable | Stock volatility |
|--------------------|------------------|
| | (1) | (2) |
| IV ESOPESOPESOPESOPESOPESOPESOPESOPO | 0.0145*** | (−6.91) |
| IV ESOP-culture-index | 1.328*** | (21.64) |
| IV Cases_Cumul_Growth | 0.0917 | 0.0809*** | (0.73) | (8.66) |
| IV Size | 0.240*** | 0.00168*** | (11.26) | (7.31) |
| IV Growth | 2.206*** | 0.0514*** | (15.14) | (7.00) |
| IV Capital | 0.0868 | 0.00596 | (1.43) | (5.22) |
| IV Deposit | 0.433*** | 0.0231*** | (3.42) | (4.02) |
| IV Operating | −0.0315*** | 0.00183*** | (−5.05) | (6.20) |
| IV d_Control | 0.270*** | 0.00571*** | (12.06) | (5.36) |
| | Country random effects | Yes | Yes |
| | Month fixed effects | Yes | Yes |
| | Observations | 1025 | 1025 |
| | R-squared: | Within | 0.26 | 0.35 |
| | | Between | 1.00 | 1.00 |
| | | Overall | 0.27 | 0.38 |
| | IV F-stat | 45.21 | 45.21 |
| | Anderson LM statistic p-val | <0.01 | <0.01 |

This table reports regression estimates of models where the dependent variable is the 5-day moving average volatility of bank stock returns (Volatility). Columns (1) and (2) report 1st and 2nd stage IV regression estimates obtained when ESOP is instrumented with the ESOP-culture-index. All variables are as defined in Table 2. The T-statistics are in parentheses, with *, **, and *** denoting significance at 10%, 5%, and 1% levels. Two identification test statistics are used. The first-stage F-statistic (IV F-statistic) tests if instruments are weak; if the IV F-statistic is smaller than 10, the instrument is weak. The Anderson canonical correlation LM statistic tests for underidentification, under the null hypothesis that excluded instruments are relevant.

Appendix E

We conduct a robustness test using a sub-sample excluding French banks

| Does ESOP reduce stock volatility during Covid lockdown? |
|----------------------------------------|------------------|
| Dependent variable | Volatility |
| | (1) | (2) |
| IV ESOPESOPO | −0.0340*** | (−4.89) |
| IV ESOP-culture-index | 0.233*** | (7.93) |
| IV Cases_Cumul_Growth | −5.31e−16 | 0.186*** | (−0.00) | (11.14) |
| IV Size | 0.126*** | 0.00767*** | (11.14) | (10.30) |
| IV Growth | 0.249** | 0.0194*** | (2.52) | (3.26) |
| IV Capital | 4.174*** | 0.220*** | (6.96) | (5.55) |
| IV Deposit | −0.604*** | 0.000300 | (−5.70) | (0.04) |
| IV Operating | −0.0159*** | −0.000292*** | (−7.71) | (2.09) |
| IV d_Control | 0.141*** | 0.00683*** | (5.44) | (4.48) |

This table reports regression estimates of models where the dependent variable is the 5-day moving average volatility of bank stock returns (Volatility). Columns (1) and (2) report 1st and 2nd stage IV regression estimates obtained when ESOP is instrumented with the ESOP-culture-index. All variables are as defined in Table 2. The T-statistics are in parentheses, with *, **, and *** denoting significance at 10%, 5%, and 1% levels. Two identification test statistics are used. The first-stage F-statistic (IV F-statistic) tests if instruments are weak; if the IV F-statistic is smaller than 10, the instrument is weak. The Anderson canonical correlation LM statistic tests for underidentification, under the null hypothesis that excluded instruments are irrelevant.

Appendix F

We conduct a robustness test using orthogonalized values of Size, Growth, and Capital instead of actual values

| Does ESOP reduce stock volatility during Covid lockdown? |
|----------------------------------------|------------------|
| Dependent variable | Volatility |
| | (1) | (2) |
| IV ESOPO | −0.0540** | (−2.09) |
| IV ESOP-culture-index | 0.0954*** | (2.78) |

This table reports regression estimates of models where the dependent variable is the 5-day moving average volatility of bank stock returns (Volatility). Columns (1) and (2) report 1st and 2nd stage IV regression estimates obtained when ESOP is instrumented with the ESOP-culture-index. All variables are as defined in Table 2. The T-statistics are in parentheses, with *, **, and *** denoting significance at 10%, 5%, and 1% levels. Two identification test statistics are used. The first-stage F-statistic (IV F-statistic) tests if instruments are weak; if the IV F-statistic is smaller than 10, the instrument is weak. The Anderson canonical correlation LM statistic tests for underidentification, under the null hypothesis that excluded instruments are irrelevant.
### Table 2: Regression Estimates

| Dependent variable          | Volatility   |
|----------------------------|--------------|
| Cases_Cumul_Growth         | $-0.192$     |
|                            | $(1.51)$     |
|                            | $0.0729^{***}$|
| oSize                      | $0.192^{***}$|
|                            | $(11.17)$    |
|                            | $0.0180^{***}$|
| oGrowth                    | $-0.130^{***}$|
|                            | $(10.30)$    |
|                            | $-0.00679^{*}$|
| oCapital                   | $0.212^{***}$|
|                            | $(12.93)$    |
|                            | $0.0114^{**}$|
| Deposit                    | $1.953^{***}$|
|                            | $(20.54)$    |
|                            | $0.129^{***}$|
| Operating                  | $0.0102^{***}$|
|                            | $(4.16)$     |
|                            | $0.00126^{***}$|
| d_Control                  | $0.0439^{**}$|
|                            | $(1.96)$     |
|                            | $0.00510^{***}$|
| Country random effects     | Yes          |
| Month fixed effects        | Yes          |
| Observations               | 1722         |
| R-squared:                 | 1722         |
| Within                     | 0.08         |
|                            | 0.06         |
| Between                    | 0.89         |
|                            | 0.45         |
| Overall                    | 0.23         |
|                            | 0.07         |
| IV F-stat                  | 18.49        |
| Anderson LM statistic      | $<0.01$      |

This table reports regression estimates of models where the dependent variable is the 5-day moving average volatility of bank stock returns (Volatility). Columns (1) and (2) report 1st and 2nd stage IV regression estimates obtained when ESOP is instrumented with the ESOP-culture-index. Size, Growth, and Capital are orthogonalized with ESOP. The model used orthogonalized values of Size, Growth, and Capital instead of actual values. All variables are as defined in Table 2. The T-statistics are in parentheses, with *, **, and *** denoting significance at 10%, 5% and 1% levels. Two identification test statistics are used. The first-stage F-statistic (IV F-statistic) tests if instruments are weak; if the IV F-statistic is smaller than 10, the instrument is weak. The Anderson canonical correlation LM statistic tests for underidentification, under the null hypothesis that excluded instruments are irrelevant.

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