# Bank Dividend Restrictions and Banks' Institutional Investors

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**Abstract**

This paper analyses the impact of banks' dividend restrictions on the behavior of banks' institutional investors. Using within-investor variation and a difference-in-differences setup, I find that mutual funds, especially high dividend-paying funds, reduce their ownership in treated banks during the 2020 payout restrictions in the Eurozone. This reduction is not reversed after the abrogation of the policy. Using data before the introduction of the ban also reveals a positive relationship between fund ownership and banks' dividend yield, highlighting the importance of dividends for European banks' fund investors. This reaction also has pricing implications as suggested by a negative relationship between cumulative abnormal returns around the restriction announcements and the percentage of fund owners per bank.

**JEL Codes: G12, G21, G23, G28, G35**
**Keywords: Dividend Policy, Mutual Funds, Institutional Investors' Ownership, Banking Supervision, COVID-19 Pandemic**

# 1 Introduction

The entitlement to receive dividends from the company's earnings typically resides in the hands of its shareholders and management. This can result in companies that have a high propensity to pay dividends, for example banks[1], attracting investors who specifically seek out these cash flows. Recent evidence shows that among them are institutional investors, notably mutual funds (see Larkin, Leary and Michaely (2017) and Harris, Hartzmark and Solomon (2015)), a significant investor group with respect to the amount of stocks held[2]. But in addition to shareholders and management, in 2020, a third party gained significance for the banking sector's dividend payments – namely, the supervisory authority. Due to the COVID-19 pandemic, supervisors around the world imposed sector-wide dividend restrictions for banks, so as to increase their resilience by retaining profits instead of distributing them via dividends (Hardy, 2021). This interference in the payout policy was unprecedented by investors as it applied to all banks regardless of their performance or capitalization[3]. Due to the ad hoc nature of the decision, it was unclear how institutional investors of banks would react to this policy, as banks usually keep their dividend payments even during times of crisis (Cziraki, Laux and Lóránth, 2022; Acharya, Le and Shin, 2017; Floyd, Li and Skinner, 2015).

The change in policy poses the following research question, which I will analyze empirically in this paper: how do institutional investors of banks' stock react to exogenously imposed temporary dividend restrictions? If there are institutional investors among banks' shareholders who insist on receiving dividends, then the restrictions could lead to reductions in their ownership shares, as they might reallocate their investments towards companies that distribute dividends. Consequently, dividend restrictions could also have negative implica-

1. See Floyd, Li and Skinner (2015) and Gambacorta, Oliviero and Shin (2020) who show that banks have a higher propensity to pay dividends. Furthermore, Koussis and Makrominas (2019) show that banks also smooth their dividends.
2. For example Molestina Vivar et al. (2023) show that in Europe institutional investors hold more than twice as many stocks than households.
3. Svoronos and Vrbaski (2020) give an overview of the BASEL III related dividend restrictions that are linked to banks' capitalization, including capital buffers and the maximum distribution amount that supervisors can influence. Additionally, Matyunina and Ongena (2022) also discuss bank capital related payout restrictions and the newly imposed restrictions during the crisis. They note that these restrictions were unprecedented to investors.

tions for banks' equity valuations, ultimately hampering banks' resilience. Conversely, if these restrictions are perceived as a temporary measure, this could also lead to the inaction of investors, since portfolio adjustments in crisis periods can be very costly. Thus, investors might just choose to ride out the restriction period and not adjust their ownership shares. Which of the two mechanisms is at play needs to be tested empirically.

I address this question by analyzing the temporary dividend restrictions imposed in the Eurozone by the Single Supervisory Mechanism in light of the COVID-19 pandemic. Using monthly investor-level data and a difference-in-difference setup, I find that mutual funds decrease their ownership shares in affected banks after the announcement of the dividend restrictions, in contrast to a comparable sample of unaffected Swiss banks. Since this measure was implemented during a period in which there were larger fund outflows, which could affect funds' ownership shares (Pástor and Vorsatz, 2020), I rely on an identification strategy that uses bank and also *investor* $\times$ *time* fixed effects. This allows me to control for time-varying investor demand factors, such as outflow-driven adjustments and helps me to pin down the effect by focusing on the within-investor-time variation in the data. The estimated effect is even long-term because fund investors do not revert back to their ownership level after the end of the restriction period. Furthermore, it is also economically meaningful because funds' ownership decreases by 16% until November 2020.

At first glance, this might appear contradictory to a straightforward demand for dividends, as one would expect that funds would return after dividends are paid again. However, this can be explained by considering the transaction costs investors would incur due to frequent adjustments and the idea that even temporary restrictions heighten the uncertainty of future policy interventions, which, in turn, increases uncertainty about future dividend payments, as emphasized by Matyunina and Ongena (2022). This can change the investment case of banks' equity for institutional investors as income investments[4] and even the European Systemic Risk Board (ESRB) made later in a concept note on March 2022 the

4. "Equity investors have traditionally viewed banks as solid, if low growth businesses that can be relied upon to pay steady income. 'But dividend bans means that way of thinking does not really work any more,' said Mr Ramos-Martin [a global equities manager at Aviva Investors].", Walker, Owen. 2020. "Europe's banks fear investor flight after dividend bans." Financial Times, December 26. https://www.ft.com/content/fd5eb169-ca1c-43c1-b67e-cbc7ede9988a.

official proposition to use this tool in crisis times in the future (ESRB, 2022). Therefore, the findings also show how even short-term interventions can have longer-term impacts through increased policy uncertainty.

The driver behind funds' demand for dividends could be the desire to either attain a smooth cash flow via smooth dividends as Larkin, Leary and Michaely (2017) have documented, or to receive just a high dividend yield that they can subsequently distribute to their investors as Harris, Hartzmark and Solomon (2015) propose. A closer examination of the fund dimension reveals that, in particular, funds paying high dividends were reducing their ownership shares by 44% more than low dividend-paying funds, supporting the notion that these funds request dividends to pass them on to their investors. Furthermore, when concentrating exclusively on banks affected by the restrictions, active high dividend-paying funds decrease their ownership shares also compared to a set of passive low dividend-paying funds, i.e. funds that would only change their ownership through benchmark changes. This result is not observed for Swiss banks – namely, the two fund groups here did not react differently, highlighting that the effect is indeed driven by changes in affected banks and not Swiss banks.

Focusing on the bank dimension, there is no differential treatment effect between dividend smoothing and non-smoothing banks, which shows that the alternative channel presented by Larkin, Leary and Michaely (2017) that mutual funds demand smooth dividends is not at play. Additionally, the ownership reduction is not explained by banks' differences in their default risk. Consequently, it is unlikely that the driving force is a rise in investors' expectations of higher bank defaults, because the intervention could have been seen as a negative signal about banks' stability. Differences in the Price/Book values can also not explain funds' ownership reductions. This suggests that banks subject to the free cash flow problem in the spirit of Jensen (1986) were not more affected than others.

The examination of dividend characteristics and fund ownership shares prior to the ban reveals a consistent and significant relation between fund ownership and banks' dividend yield. Specifically, a one percentage point increase in the dividend yield is related to an increase in fund ownership shares by 10%. This highlights that funds seem to be interested in dividends per se rather than a smooth cash flow stream provided by dividend-smoothing banks.

Lastly, I also investigate whether this reduction in the ownership of fund investors has implications for affected banks' equity valuations. I find a negative relationship between the percentage of fund owners per bank and the banks' cumulative abnormal returns (CAR) on the announcement of the policy. A higher share of fund owners led to a 7.5 percentage point lower CAR of affected banks. This negative effect persisted during the announcement of capped dividend payouts and the abrogation of the policy, highlighting the long-lasting effects on the equity valuation of banks.

This study contributes to the literature on dividends and institutional investors. In their survey of firm executives Brav et al. (2005) find that corporate managers think households are the ones who care about dividends. This is in line with the demand-side approach to asset pricing of Koijen and Yogo (2019), where they verify that households have the strongest demand for dividend yields. Koijen, Richmond and Yogo (2023) further show that the dividend demand of institutional investors except for the private banking group is at best negative. I focus on institutional investors of banks and find that among those, funds are the investors who are interested in dividends, relying on an exogenous event instead of an instrumental variable estimation. Furthermore, I find that mutual funds' dividend demand is rather driven by the dividend level than its stability, as there is no evidence that dividend smoothing is impacting funds' ownership shares. This is in contrast with the results of Larkin, Leary and Michaely (2017) for non-financial corporations. However, it is in line with the findings of Harris, Hartzmark and Solomon (2015), who analyze an extreme case of mutual funds dividend demand by excessive trading to capture dividends.

Additionally, another related strand of the literature is that of banks' payout policies. Abreu and Gulamhussen (2013) find that dividend payments for United States banks are in line with reducing the agency conflict of the free cash flow between shareholders and management (Jensen and Meckling, 1976; Jensen, 1986). Koussis and Makrominas (2019) analyze the dividend smoothing of European and US banks using the Lintner (1956) approach. They find that the agency conflict theory can explain dividend smoothing, but also that banks seem to smooth dividends a bit less than non-financials. Building on this literature, I find that banks are also engaged in dividend smoothing, but to a lesser extent. Cziraki, Laux and Lóránth (2022) analyze the dividend policy of U.S. banks during the financial crisis and document that institutional investors did not push banks to increase their dividend payments during the crisis. While they look at institutional investors' impact on banks' behavior during the financial crisis, I investigate how dividends and their restrictions affect institutional investors' behavior.

This paper also contributes to the growing literature examining the impact of sector-wide dividend restrictions during the COVID-19 pandemic (Hardy (2021); Martinez-Miera and Vegas Sánchez (2021); Dautović, Gambacorta and Reghezza (2023); Andreeva et al. (2023); Kroen (2022); Vadasz (2022); Marsh (2023); Cáceres García and Lamas (2023); and Sanders, Simoens and Vander Vennet (2024)). Previous work focuses on banks' risk-taking behavior and dividend restrictions. This paper complements this literature by looking into institutional investors' reactions. Whereas Hardy (2021) gives a comprehensive overview of the reactions of policymakers around the world, Kroen (2022) finds evidence for a reversal in risk shifting between equity holders and debt holders for US banks after the introduction of mainly share repurchase related payout restrictions. The interaction of the regulator, banks, and their investors after the regulator started to intrude into the payout policy of banks is modeled by Vadasz (2022). Vadasz (2022) shows that such discretionary ex-post interventions could even reduce the positive effects of dividend smoothing on risk management and bank value. Complementary to his findings, I document that the temporary dividend restrictions have a long-term effect on the ownership structure of the banks. The lending channel of this policy is analyzed by Martinez-Miera and Vegas Sánchez (2021), Dautović, Gambacorta and Reghezza (2023) and Sanders, Simoens and Vander Vennet (2024). While Martinez-Miera and Vegas Sánchez (2021) focus on Spanish banks and use as identification the separation of dividend payers and non-payers during the restriction, Dautović, Gambacorta and Reghezza (2023) use supervisory data on distribution plans of significant institutions in the Eurozone to identify the effect. Both studies find a positive effect of lending to non-financial corporations. Sanders, Simoens and Vander Vennet (2024) also document an increase in syndicated lending and a negative stock price responses of European banks. However, the negative stock price reaction does not affect their lending results. Andreeva et al. (2023) analyze the impact of this regulation on bank equity valuations also using the supervisory data on distribution plans, as Dautović, Gambacorta and Reghezza (2023) do. They find a negative impact on banks' equity valuations, which is mostly driven by the uncertainty of future distributions and by banks that had planned to pay out dividends but could not live up to investors' demanded returns. For the US setting, Marsh (2023) finds that larger banks faced negative stock price reactions to the announcement of dividend restrictions and spillover effects to unaffected banks. Lastly, in a concurrent study Cáceres García and Lamas (2023) analyze the reaction of income funds to the dividend restriction. While only focusing on the complete exit of the stock using Lipper data, they find that income funds temporarily exit affected banks' stocks. Moreover, they find a negative stock price reaction at the announcement of the restrictions for banks with a higher exposure to income funds. In contrast, I focus on a different dimension affected by payout restrictions, namely the broader institutional ownership structure of banks. I find that among institutional investors funds reduce their ownership shares over the longer term, capturing not only exits but also reductions in ownership stakes. Moreover, I not only document that banks with higher fund ownership experience larger drops in their equity valuations at the announcement of the restrictions, but also show that these negative differentials persist even at the relaxation and abrogation announcements, in line with the policy uncertainty argument of Andreeva et al. (2023).

## 2 Data

I draw on several data sources, where the building block of the dataset is the monthly ownership data obtained from FactSet's Ownership database. Here I retrieve the total ownership shares of the group of institutional investors, funds, and insiders/stakeholders, but also investor-level ownership data for these three groups. FactSet's source for the ownership builds on quarterly 13F filings and the monthly sum of funds data. 13F filings are a requirement for institutional investors that manage more than $100 million in the US and have a quarterly filing frequency. Thus, I will in the empirical section 3.2 only rely on the sum of funds data when using the monthly frequency of the dataset. Applying this separation prevents the results in the monthly frequency from being downward biased by lower time variation since FactSet carries over values from 13F filings each month within each quarter if no change was reported. Furthermore, it alleviates issues related to selection bias in the owner dimension due to reporting requirements at the cost of lower ownership coverage (see e.g. Steuer (2022), who compares the different reporting requirements in the US and EU and the impact on FactSet's reported ownership)[5]. This limitation is also not too restrictive since *Table A2* shows that 85% of the observations are not from 13F filers and even for the group of institutional investors, which exhibit a larger share of 13F filers, the data still cover more than half of the observations in this group. Furthermore, *Figure A1* in Appendix A1 shows that the FactSet data is very comparable to the SHS dataset of the European Central Bank (ECB) that covers all investments of Eurozone investors in Eurozone banks' listed shares. This also holds for the subset of the non-13F filing source.

Furthermore, to better extract funds' ownership shares from other institutional investors' ownership shares, I apply further data aggregations and transformations on the FactSet ownership data which are explained in detail in Appendix A1.

I also retrieve investors' net outflows, return, size, and income return ranking from Morningstar. Unfortunately, these data are only available for a subset of investors as I could not retrieve for all investors an ISIN or CUSIP number from FactSet for the matching of the datasets.

Balance sheet data for European banks are acquired from S&P Capital IQ, where I rely on the SNL Financials dataset. Market data and the data to calculate the dividend smoothing measures are taken from FactSet. This is then enhanced for the stock market reaction analysis with the daily Fama/French European 3 Factors and 5 Factors available on Kenneth French's website[6]. For the analysis using yearly data on the ownership groups

5. In the empirical section 3.2 the identification relies on individual owner-level data and not the total amount of all owners, thus, not having full coverage of all investors is not an issue as long as these investors are not systematically different. This would be the case by only relying on 13F filings for European stocks.
6. See `https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html`.

in section 3.2.3, I use the yearly reported averages of aggregate ownership by funds reported by FactSet.

To combine the different data sources into one data set, I match the FactSet investor ownership data and market data with the SNL Financial data by using the ISIN of the companies and in case of missing ISINs I fill this with hand-matched data on the Legal Entity Identifier (LEI) and the name. Lastly, Single Supervisory Mechanism (SSM) significance status is matched for each bank by LEI. In case of missing LEIs in SNL I manually fill the matches by name. For the classification of significant institutions (SI) and less significant institutions by the SSM, I relate to the excel and pdf files of March 2020 available on the SSM webpage[7]

In total, the sample contains 66 European and Swiss banks of which four European banks already paid dividends and 12 European banks canceled their dividends before the restrictions leading to 50 sample banks for the empirical analysis. In the investor dimension, the sample covers 5467 fund investors and 1831 institutional investors as of February 2020.

I limit price-to-book values to 20 following Larkin, Leary and Michaely (2017) and omit in the pre-intervention period analysis in section 3.2.3 observations with an aggregate ownership above 110 %. I assume that aggregate ownership between 100% and 110% is due to measurement errors and truncate them to 100%. All monetary variables are measured in EUR and the later estimated smoothing measures as defined in section Appendix A2 are winsorized at the 2.5% level.

*Table 1* shows the descriptive statistics for the pre-intervention period for the sample of banks used in this study. Although the institutional investors hold on average 20% of the total share of each bank there are also banks where more than half of their shareholders are identified as institutional investors. Among the institutional investors, funds are the largest shareholders as they hold on average 17% of bank shares. Again the maximum of fund investors per bank is around 48% indicating that there are banks with almost half of their owners being funds. For the insider category, which also includes the government, we can see that there are banks that are almost completely held by this group. The dividend dimension

7. See `https://www.bankingsupervision.europa.eu/press/publications/html/index.en.html?skey=list`.

of the data reveals a substantial dividend yield over the time period of on average 3.6%. The smoothness of the dividend is measured by the variables Speed of Adjustment (SOA) and Relative Volatility (RelVol), which are defined in the Appendix A2. For both measures, a lower value translates into more dividend smoothing. Whereas RelVol captures more how volatile actual dividends are to the payout target, SOA captures how fast dividends adjust to a payout target. So investors who prefer a certain dividend level might prefer lower SOA over lower RelVol, since in the latter case the dividend can still be far away from its target. On the other hand, if investors rather prefer a low volatile income they would select lower RelVol over lower SOA. *Table 1* shows that the average speed of adjustment is around 0.5. This value is much larger than the one estimated by Leary and Michaely (2011) for non-financial firms in previous years but also compared to the estimate of Koussis and Makrominas (2019) who find an average of around 0.3 for the time period of 1998 to 2016. The lower dividend smoothing could be explained by the inclusion of the crisis periods in its estimation and the shorter time period under study compared to the other studies. Furthermore, smoothing measured by the volatility of dividends to earnings, RelVol, shows that on average dividends are more volatile than earnings for banks over the time period from 2016 until 2019.

# 3 How Do Institutional Investors React to Dividend Restrictions?

To study the impact of dividend restrictions on institutional investors of banks' stocks, I rely on a quasi-natural experiment to identify the causal mechanism in a difference-in-difference setup. In particular, I use the dividend restrictions implemented by the SSM in 2020 for the significant banks in the Eurozone as an exogenous shock to the payout policy (treated group), where Swiss banks are the control group. I restrict the period under study from 2018 to 2021 and use monthly data, to estimate the effect more precisely. The descriptive statistics for the monthly dataset of mutual funds and institutional investors excluding mutual funds are presented in *Table 2*.

The SSM dividend restrictions are a useful natural experiment for analyzing the implications of payout restrictions on the shareholder base. First, European banks conducted more dividend-smoothing compared to their US counterparts in the past (Koussis and Makrominas, 2019). This makes European banks particularly sensitive to dividend restriction policies because they provide a smooth cash flow to their investors. Second, in the Eurozone, payout restrictions had an impact on both dividends and repurchases, thereby preventing any kind of payout to the shareholders. This equal treatment among payout methods is important to rule out any shifts to alternative payout methods during that period, which would still yield a smooth income stream for investors. Hardy (2021) shows that this equal treatment was not the case for other jurisdictions, because for example, the dividend payments of US banks were largely unaffected, in contrast to repurchases, which decreased a lot. Third, the Eurozone was among the first regions to implement dividend restrictions, which limits the possibility of market participants anticipating the measure as the COVID-19 pandemic spread out and helps to estimate the effect more precisely.

## 3.1 Restricting Dividends in the Eurozone

On the 27th of March, as a response to the threats to the banking sector caused by the COVID-19 pandemic, the ECB released a recommendation that stated that SIs[8] should refrain from dividend payments and share repurchases. This measure was introduced at the consolidated group level of the significant institutions and was at first set to be in place until the 1st of October 2020 (ECB/2020/19). The justification for this recommendation was to prevent banks from distributing freed-up capital to their shareholders from of the reduction in the buffer requirements, which was announced on the 12th of March in a press release[9], and to make banks, in general, more resilient to the crisis by retaining capital. While at first aimed at SIs, many national supervisory authorities implemented the recommendation

8. A financial institution is classified as significant and then subject to the direct supervision of the SSM by the following criteria: (1) Total assets exceed € 30 bn., (2) is important for the country's economy or the whole EU, (3) total assets exceed € 5 bn. and cross border assets/liabilities to its total assets exceeds 20%, (4) requested or received financial aid from the European Stability Mechanism or the European Financial Stability Facility. See: `https://www.bankingsupervision.europa.eu/banking/list/criteria/html/index.en.html`

9. See: `https://www.bankingsupervision.europa.eu/press/pr/date/2020/html/ssm.pr200312~43351ac3ac.en.html`

shortly afterward for less significant institutions (Beck et al., 2020).

Due to the ongoing COVID-19 pandemic in Europe, the ESRB also issued a recommendation to limit payouts for financial institutions until the end of the year 2020 at their 27th of May meeting (ESRB/2020/7)[10]. The recommendation of the ESRB was more strict than that of the ECB because it not only banned payouts until the end of the year, but also implemented restrictions on variable remuneration. The ECB issued, as a response, another recommendation on the 27th of July 2020, which extended the measures implemented in March until the 1st of January 2021 (ECB/2020/35). Furthermore, the variable remuneration restrictions were then also passed on to the banks supervised directly by the ECB via a letter[11].

On the 15th of December, the ECB again extended the recommendation, because the macroeconomic situation was improving but threats to the banking sector still remained due to the postponed impact on banks' balance sheets (ECB/2020/62). In contrast to previous notices, this time the supervisor acknowledged the improved economic situation and allowed again dividend payouts and repurchases, but these were limited to a maximum of 15% of the cumulative profit of 2019 and 2020, or 20 basis points of their Common Equity Tier 1 (CET1) ratio at the end of 2020 (ECB/2020/62). This recommendation was valid until the end of September 2021. The official end of the restrictions was then announced on the 23rd of July with the recommendation ECB/2021/31, which verified that all dividend restrictions in place were to be lifted after the 30th of September 2021.

In contrast to this interference in the payout policy of SIs, the Swiss banking supervisor, the Swiss Financial Market Supervisory Authority (FINMA), took a different approach. On the 19th of March FINMA mentioned for the first time that financial institutions should follow a prudent payout policy[12]. This comment was picked up on the 25th of March, when the warnings of non-prudent payout policies were intensified and it was recognized that Swiss

10. Note that the public was informed later at the 8th of June in a press release of the ESRB: `https://www.esrb.europa.eu/news/pr/date/2020/html/esrb.pr200608~c9d71f035a.en.html`

11. See ECB press release of 28th July 2020: `https://www.bankingsupervision.europa.eu/press/pr/date/2020/html/ssm.pr200728_1~42a74a0b86.en.html`

12. See FINMA press release of 19th March 2020: `https://www.finma.ch/en/news/2020/03/20200319-mm-corona/`

banks had suspended their share repurchase program[13]. Finally, by the end of March 2020, FINMA issued the Guidance 02/2020, which again warned of non-prudent payout policies and summarized the capital relief measures that applied to banks' capital requirements. In contrast to banks supervised by the SSM, FINMA explicitly stated that if banks make profit distributions, this would lead to a reduction in the leverage ratio relief measures by the equivalent amount. Therefore, dividend distributions were not ruled out in Switzerland.

These different approaches by the supervisory authorities in the SSM and in Switzerland make the two jurisdictions candidates for a difference-in-difference setup. First, it is important to note that both regions implemented their measures around the same time, i.e. end of March 2020. Furthermore, both implemented relief measures for capital requirements, which affect the stability and profitability of the institutions due to continued lending in times of crisis when capital ratios could fall. Additionally, both regions experienced similar impacts from the pandemic, as shown in *Figure A2* in the appendix, which illustrates that the number of new COVID-19 cases per million capita evolved in a similar manner. Lastly, a recent study by Hager and Nitschka (2022) shows that Swiss stock markets behave similarly to stock markets in the Eurozone in response to the ECB monetary policy surprises. This also alleviates the issue that ECB policies, like the Pandemic Emergency Purchase Programme (PEPP) drive the difference between the two groups.

To rule out voluntary dividend cuts of banks before the restriction was announced, I examined banks' ad-hoc announcements and excluded from the treated sample all banks with a dividend cut announcement before the restrictions were introduced. This ensures that the treated sample only contains banks that are exogenously affected by the dividend restrictions. Furthermore, I leave out banks that had already paid their dividends, since these banks pay quarterly or semi-annual dividends. Therefore, the timing and status of any effect on these banks cannot be determined precisely, which could attenuate or bias the estimates[14]. This results in a sample of 50 banks, including 26 treated banks, and 24 control

13. See FINMA press release of 25th March 2020: `https://www.finma.ch/en/news/2020/03/20200325-mm-garantiepaket/`

14. These banks are: Banco Bilbao Vizcaya Argentaria SA (ex-date 7th of April, announced 30th of January), Banco de Sabadell SA (ex-date 1st of April, announced 31st of January), Bankinter SA (ex-date 24th of March, announced 18th of February), CaixaBank SA (ex-date 9th of April, announced 30th of January). There were also banks from other countries that paid dividends in 2020, but these were non-listed banks

banks[15].

*Figure 1* Panel A shows the dividend yield as dividends over year-end market value and the total dividend yield, which includes repurchases for both groups. Dividend yields decreased significantly for treated Eurozone banks in the fiscal year 2019, while their Swiss counterparts did not significantly change their dividend yields. This is in line with the recommendation since dividends paid out in 2020 refer to the 2019 fiscal year and the positive amount can be explained by banks that already paid out dividends before the intervention. The rebound in the dividend yield in 2020 shows that banks were using the margin given by the SSM in December 2020 for the limited dividend payments, but this resulted in lower dividend yields compared to 2018. Repurchases followed dividends very closely for the treated banks, resulting in a parallel path of the dividend yield and the total dividend yield, whereas for the Swiss banks' average repurchases seem to have increased over the years although the confidence bands are quite wide.

Since dividends could also just fall because of lower distributable profits, *Figure 1* Panel B shows the payout ratio, as measured by dividend per share (DPS) over earnings per share (EPS), and the total payout ratio, which includes repurchases in DPS for the two groups. For treated banks, the analysis shows that for the 2019 dividends both payout ratios significantly fall, but in 2020 they already rebound close to their previous values. The set of control banks has a rather stable payout ratio although the average total payout ratio even increased from the fiscal year 2016 to 2020 and dropped in 2021. However, the values are not significantly different from their 2018 value. For the event year, payout ratios even increased a bit for Swiss banks, which could be due to the pressure on their profits during the COVID-19 crisis. Overall, these results indicate that the recommendation was binding for the treated institutions, while Swiss banks' ratios were unaffected.

A first insight into the reaction of the market can be obtained from the dividend futures of European banks. I rely here on the Euro Stoxx Banks dividend future indices for different maturities to capture market expectations about Eurozone banks' dividends[16]. To isolate

and thus had missing data for relevant variables.

15. See appendix *Table A3* for a list of the banks in the sample

16. In February 2020 the constituents of the Euro Stoxx Banks index contained 24 Eurozone banks of which only 2 were not group heads of SI groups: Finecobank S.p.A and Natixis. Therefore, the index is a good

bank-specific changes from effects that affect the whole market, I divide the Euro Stoxx Banks dividend future indices by the respective Euro Stoxx 50 dividend future indices, where the latter captures market-wide effects on dividend expectations.

The evolution of the standardized bank dividend future series can be seen in *Figure 2* for 2020 to 2023 contracts. Values are normalized to the values of each series one day before the dividend restriction announcement, i.e. the 26th of March 2020. The announcement of the dividend restrictions at first only affected the expectations about the 2020 dividends since only the 2020 series decreased shortly after the announcement. Yet, this decrease is substantial, where after a couple of days the dividend future loses more than half of its value. The expectations about dividends after 2020, which are captured by the 2021 to 2023 series, only decline below their 26th of March value at the end of April, coinciding with the release of the first quarter earnings reports of banks. This shows that this measure was at the beginning just seen as a temporary restriction.

Another shock to the dividend expectations was the announcement of the ESRB recommendation on the 8th of June 2020, where all future series decreased. Taking the evolution of the standardized Div. Fut. Banks/Euro 20 into account, this seems to be the point at which market participants expected that the SSM dividend restrictions would be prolonged because it drops to a similar value as after the official announcement of the extension in July 2020. Interestingly, the announcement of the extension seems to impact the 2020 future and the longer maturities, but not the 2021 dividend future.

Towards the end of the year, some SSM officials gave interviews to the press, which are captured by the dotted lines in *Figure 2*. The first of these events occurred on the 5th of November 2020 when the head of banking supervision of the ECB, Andrea Enria, stated that they are in a wait-and-see phase regarding the relaxation of the measures for the next year. On this day the volume traded of the 2021 bank dividend future index increased remarkably as evident in *Figure 2* right scale[17]. Furthermore, the 2021 to 2023 standardized dividend

proxy of treated banks' dividend expectations.

17. Note that the spike in the traded volume on the 9th of November shortly afterward coincides with the success announcement of COVID-19 vaccines in trials, the final stage before marketing. See: Miller, Joe and Kuchler, Hannah and Mancini, Donato Paolo and Cookson, Clive. 2020. "Pfizer and BioNTech's Covid-19 vaccine found to be 90% effective" Financial Times, November 9. `https://www.ft.com/content/9bde4bff-acf0-4c2a-a0d0-5ed597186496`.

future series also increased a lot on this day. Another news article appeared on the 25th of November 2020 in the Financial Times, where it was stated that dividend distribution would be possible again next year. Again on this date, the dividend future series for the next years increased remarkably, and the traded volume of the 2021 contracts was also high. Lastly, one day after the official announcement date, which revealed constrained dividend payments for 2021, the 2021 series decreased while the 2022 and 2023 series experienced small increases. This could be explained by the fact that market participants were not expecting such constrained payouts in 2021, but still, the outlook of making payouts increased the expectations for 2022 and 2023.

## 3.2 Event Study Analysis

Having established in the previous section that the restrictions for the treated group of banks were binding and that the control group was unaffected, I now turn to the main analysis of the paper, where I investigate the investor-level behavior in response to the dividend restrictions. One caveat of this analysis is that there could be concurrent events that affect investor behavior after the announcement (e.g. PEPP announcement). To overcome this issue and to isolate the treatment effect on the investor level, I rely on a within-investor identification strategy. Given the granular investor-level data, I include interacted fixed effects on the investor and time level. These fixed effects control for any time-varying effect per investor, i.e. investor demand side factors, and isolate effects within an investor. This approach is only valid if there are enough investors who invest in treated and control banks. The variable Ratio Treated-Control in *Table A2* represents the share of treated banks to all banks in the data an investor is invested in. Data on this variable is missing if an investor is not invested in any of the sample banks. This number is not zero or one for the 25th percentile to the 75th percentile for all groups except for the insider/stakeholder group, leaving enough heterogeneity in the data for the analysis. I also drop exchange traded funds (ETF) and funds with the FactSet holding style "Index" for this analysis to prevent a mechanical adjustment in the ownership due to benchmark index constituent changes[18].

18. *Figure A5* in the appendix indicates that ETFs were also not affected by the restriction.

Lastly, I omit in the institutions' group the Norwegian Government Pension Fund Global, because this fund has large ownership shares that change mostly at the end of the year. This leads to block formation of the monthly event study coefficients standard errors as evident in *Figure A5*, where the fund is included, yet these results are consistent with the main results without the fund, presented in *Figure 3*.

One possible issue in the proposed analysis could be that the sample of Swiss banks does not represent a good control group for significant banks in the Eurozone. On the one hand, the significance status of Eurozone banks is mainly determined by size, whereas in the control group a large share of small banks are also included. On the other hand, Swiss banks could be more resilient by having higher capital ratios and Price/Book values. Although FINMA mentions in its decision that the Swiss banking sector is resilient, the ECB also stated that European banks are resilient but nevertheless implemented the restrictions. Ultimately, it is not clear what measures influenced the supervisors' final decisions. It might be that the ECB took measures to limit banks' dividends because larger banks have a higher probability to pay dividends (in particular during crises) as Abreu and Gulamhussen (2013) show, or because they have lower franchise values and thus are more exposed to the free cash flow problem. This issue might not be overcome by just controlling for size in the regressions via bank-fixed effects. Furthermore, there could be also unobserved confounders that affect the treatment status and the reaction of investors. For example, Swiss banks could have different business models despite operating in similar markets[19].

To alleviate these issues, I conducted a propensity score matching to make the treatment group and control group of banks more comparable. I use k-nearest neighbor matching with a maximum of two control banks per treated bank and set the threshold for the propensity score to 0.1. I match on the already mentioned size, Price/Book ratio (a proxy for the franchise value), and the Tier1 capital ratio values one year before the dividend restrictions, i.e. in 2019. To overcome common support issues, I trim the matched sample by excluding all control banks that have a lower propensity score than the lowest propensity score of the treated banks. This effectively removes only one bank. The sample means of the matched

19. Note that for 15 out of 25 significant institutions in the sample that have segmented net income available, on average 68% of their net income is domestic, indicating that these banks mainly operate in Europe.

treated and control groups can be found in *Table 3*. After trimming, the treated and control group averages are quite similar for the matched variables size, Price/Book ratio, and the Tier1 capital ratio. Additionally, the averages of the smoothing proxies RelVol and SOA, the proxy for the banks' business model Loans/Deposits, the percentage of institutional investors holding the bank's stock, and the return on assets in 2019 are very similar. The t-tests of the means for these groups are insignificant and indicate a good match. Lastly, to see if the two groups are similar in forward-looking risk measures, the last two rows of *Table 3* contain the weighted average cost of debt in the years 2019 and 2020.[20] Again, the averages of the two groups are statistically not different from each other and thus indicate that funding costs for the treated banks were similar before and during the restriction period.

This matched sample can now be used to look into the overall impact of the regulations, by using a classical difference-in-difference approach, because all banks are treated at the same time. The treatment timing indicator is split in this setting into three different bins, each representing a different period of the regulation: March to November 2020 (restriction), December 2020 to June 2021 (relaxation), and July 2021 onwards (expiration). Since ownership shares are right-skewed and the investor-level data also contains zeros, I follow the suggestions of Cohn, Liu and Wardlaw (2022) and Silva and Tenreyro (2011), and apply instead of a $Log(1+y)$ transformation for the dependent variable, a Poisson pseudo-maximum likelihood regressions to estimate the effect on ownership percentages. This approach allows me to also include multi-way fixed effects but circumvents the incidental parameter bias.

The model is as follows:

$$\begin{aligned} Ownershare_{b,i,t} = exp\Big(&\alpha + \delta_1 Treated_b \times \mathbb{1}(Restriction)_t \\ &+ \delta_2 Treated_b \times \mathbb{1}(Relaxation)_t \\ &+ \delta_3 Treated_b \times \mathbb{1}(Expiration)_t \\ &+ \phi' X_{b,t} + \gamma_{t,i} + \gamma_b + \varepsilon_{b,i,t}\Big) \end{aligned} \tag{1}$$

20. I use the weighted average cost of debt provided by FactSet, as Credit Default Swaps (CDS) spreads are not available for many control banks.

where $Ownershare_{b,i,t}$ is the $\%Ownershare_{b,i,t}$ for investor $i$ at month $t$ in bank $b$. $\mathbb{1}(Restriction)_t$ is an indicator variable for the period March 2020 to November 2020, $\mathbb{1}(Relaxation)_t$ for the period December 2020 to June 2021, and $\mathbb{1}(Expiration)_t$ for the period on and after July 2021. $Treated_b$ is the treatment group indicator for each bank $b$. $X_{b,t}$ are bank-level control variables, i.e. the change in the shares outstanding to eliminate changes induced by the company by issuance or repurchases (for the control group), and the exchange rate to EUR. In an additional specification I also add the lagged stock return over the month of a bank, the lagged volatility of the bank's daily stock returns over the past 21 business days to control for changes due to the performance of the stocks. $\gamma_{t,i}$ is the $investor \times month$ fixed effect to control for investor demand-side effects and $\gamma_b$ are the bank fixed effects. The coefficients of interest are $\delta_1$, $\delta_2$, and $\delta_3$, which measure the restriction impact, relaxation impact, and the impact after the expiration of the restriction, respectively.

*Table 4* shows the results for the sample of funds. Column (1) shows the effects of the baseline controls, i.e. change in the shares outstanding and the exchange rates, using only bank and month fixed effects. Here no effect can be detected by the regulation since the interaction terms are all insignificant. Replacing in column (2) the month fixed effects with $investor \times month$ fixed effects shows that all the coefficients on the interaction terms become more negative and they all turn significant at the 5% level, indicating a long-term reduction in the ownership shares of funds after the dividend restrictions. It is also noteworthy that the effect seems to increase over time as the coefficient for the restriction phase to the expiration phase increases from -0.11 to -0.35. This represents a decrease in the average fund ownership in the restriction period of $(exp(-0.112) - 1) * 100 = -10.6$ % per investor. Adding additional controls for risk and return, i.e. the lagged monthly return and the stock volatility, in column (3) does not change the coefficients' magnitude in a meaningful way and only increases the significance of the restriction period coefficients that is now significant at the 1% level.

While funds seem to be immediately affected by the restriction, *Table 5* shows the results for institutions other than funds. Again, column (1) shows the results with only bank and month fixed effects, while (2) and (3) use investor time month and bank fixed effects. Across the specifications, there seems to be no effect on institutions because all interaction terms are insignificant. This is in line with the findings of Larkin, Leary and Michaely (2017) and Harris, Hartzmark and Solomon (2015), which find that funds are investors that demand dividends. However, the estimates are also less precise because the standard errors of the coefficients are much larger than the ones in the specification for funds. This is not only due to the smaller sample size but could also be attributed to the higher overall variation in ownership shares for institutional investors, as evidenced in *Table 2*.

Due to the dynamic nature of the treatment effect of the restriction, I also estimate an event study Poisson pseudo-maximum likelihood regression to see the evolution of the treatment effect. In particular, I follow Freyaldenhoven et al. (2021), where the setting under study has the advantage of no staggered implementation. Let $\tau$ be the month of the implementation of the restriction, i.e. March 2020, then the event study model is as follows:

$$\begin{aligned}
Ownershare_{b,i,t} = exp\Big(&\alpha + \beta_{-10}\mathbb{1}(t \leq \tau - 10) + \sum_{k=-9}^{18} \beta_k \mathbb{1}(t = \tau + k) + \beta_{19}\mathbb{1}(t \geq \tau + 19) \\
&+ \delta_{-10}\mathbb{1}(t \leq \tau - 10) \times Treated_b \\
&+ \sum_{k=-9}^{18} \delta_k \mathbb{1}(t = \tau + k) \times Treated_b \\
&+ \delta_{19}\mathbb{1}(t \geq \tau + 19) \times Treated_b \\
&+ \phi' X_{b,t} + \gamma_{t,i} + \gamma_b + \varepsilon_{i,t,b}\Big) \qquad (2)
\end{aligned}$$

where $Ownershare_{b,i,t}$ is the $\%Ownershare_{b,i,t}$ for investor $i$ at month $t$ in bank $b$. $Treated_b$ is the treatment group indicator for each bank $b$. $X_{b,t}$ are bank-level control variables, i.e. the change in the shares outstanding, to eliminate changes induced by the company by issuance or repurchases (for the control group), and the exchange rate to EUR. $\gamma_{t,i}$ is the $investor \times month$ fixed effect to control for investor demand-side effects and $\gamma_b$ are the bank fixed effects. The coefficients of interest are in the array of $\{\delta_k\}$, where $\delta_{-10}$ captures all time periods on and before May 2019 and $\delta_{-9}$ to $\delta_{-1}$ would capture pre-event trends and help to support the parallel trend assumption. The impact of the dividend restrictions is captured by the coefficients $\delta_0$ to $\delta_{15}$ because they span the time horizon from March 2020 to July 2021, when it was announced that the dividend restrictions would not be extended. To overcome the multi-collinearity issues associated with the indicator variables, I follow the suggestion of Freyaldenhoven et al. (2021) and normalize the event study plots' coefficients to the February 2020 value, given that the impact of COVID-19 on financial markets in Europe began in February. Furthermore, I add sup-t confidence bands proposed by Montiel Olea and Plagborg-Møller (2019) for the event study plots to rather draw conclusions on the joint significance of the event path than its individual significance at certain points in time.

The event study plots of the regression model described in equation (2) can be found in *Figure 3*, Panels A and B for each sub-sample, while the regression tables are *Table A4* and *A5* in the Appendix A3. For funds, in Panel A of *Figure 3*, the pre-announcement coefficients are insignificant and are around zero, indicating parallel trends. While the March 2020 coefficient shows no significant change, from April 2020 onwards the ownership shares of funds in treated banks decrease. This decrease is statistically significant at the 10% level. From June 2020 onward the point estimates are also significant at the 5% level and indicate a permanent decrease of funds' ownership shares in treated banks. Also, the joint significance bands from August 2020 onwards are significant at the 5% level. The estimates show that individual funds decreased their ownership shares by around $-16\%$ in November 2020, which then even increased to around $-27\%$ in June 2021. In contrast to the effect evident in *Figure* 3 Panel A, the results for institutional investors in Panel B show no significant effect.

As shown in *Table 4*, adding the stock return of the previous month and the daily return volatility does not alter the results as evident in Appendix A3 *Figure A3*, Panels A and B.

The previous estimates showed the combined effect on the intensive and extensive margin, i.e adjusting the existing ownership shares and entering or exiting banks' stocks. While this shows the average treatment effect on fund ownership, it is also interesting to look into the extensive margin effect of this regulation – the exit decision. Appel, Gormley and Keim (2016) show for example a positive effect on governance by having fund investors and

Pathan et al. (2021) show that fund investors reduce the riskiness of banks, and thus have a positive effect on banks' stability. Therefore, an exit of fund investors could have negative side effects. *Figure 3*, Panel C, shows the linear probability model estimation of equation (2), where the dependent variable has been replaced by an indicator variable being 1 if investor $i$ is invested in the bank $b$ at time $t$ and the right-hand side of the equation has been transformed logarithmically. The point estimates start to decrease in April and turn statistically significant in June 2020, which coincides with the public announcement of the ESRB's recommendation. Recall that the ESRB recommendation was the first indication of an extension of the dividend restrictions of the ECB and revealed that the measures would not be as short-term as previously announced. This indicates that fund investors did not immediately exit the banks when the measures were first announced, but started to exit these stocks in June 2020. Considering the joint significance bands, this effect is statistically significant until February 2021. From March to June 2021, the point estimates are slightly increasing again. The latter would be in line with the restart of dividend payments of treated banks in April and May 2021. However, the point estimates stay negative even after June 2021 and are also estimated with higher uncertainty. In November the estimate is around $-0.10$, indicating a 10% lower probability of holding treated banks' stocks. Panel D shows the results for institutional investors other than funds. Here we can also see a significant decrease in the pseudo probability, although the decrease is more abrupt, smaller, and partly reverts in March 2021. The effect is not as pronounced as for fund investors, since for example the estimate in November 2020 only amounts to a reduction of 8%.

Appendix A3 *Figure A4* also shows the results for the unmatched sample. Here, the reaction of funds is lower, not persistent, and statistically insignificant as evident in *Figure A4*, Panel A. For institutions using the joint confidence bands, there is also no effect evident, although the parallel trend assumption cannot be supported here due to the non parallel pre-event trends. However, regarding the exit decision, the effects seem to be similar.

### 3.2.1 Dividend Funds

The analysis thus far has shown that fund investors reacted to dividend restrictions. Yet, the motivation for this behavior is unclear. To further investigate why fund investors are reducing their ownership shares, I will rely in this section on a subset of the dataset, which is matched with fund-level data of Morningstar. In line with the findings of Harris, Hartzmark and Solomon (2015), it could be the case that fund investors of banks' stock have a dividend distribution goal themselves, and thus want to invest in dividend-paying stocks to pass on these dividends to their investors. In fact, *Table 2* shows that the median fund investor has a ranking of 33 in the income return distribution per Morningstar Category in 2019. This return is derived from the dividend distributions of the funds that are reinvested and the highest dividend payers are classified with a ranking of 1. Thus, these funds had higher dividend distributions in 2019 compared to their peers[21].

To see if funds' own payout policies explain the previous results, I use an indicator variable of 1 for funds with an income return ranking of 33 and lower, and 0 for funds with a ranking of 66 and higher. Thus, I compare funds in the lower third of the dividend distribution to funds in the upper third, which is possible due to the rich investor dimension of the data. Furthermore, in this section, I only consider funds that are in the sample for the full four years of the estimation period, i.e. 2018 to 2022.

I then use this indicator variable in a triple difference setup where I interact the interaction terms of equation (1) with the additional indicator variable for high dividend distributing funds:

21. The correlation of the 2019 income return with 2018 and 2017 is above 0.7 each.

$$
\begin{aligned}
Ownershare_{b,i,t} = exp\Big(&\alpha + \delta_1 Char_i \times Treated_b \times \mathbb{1}(Restriction)_t \\
&+ \delta_2 Char_i \times Treated_b \times \mathbb{1}(Relaxation)_t \\
&+ \delta_3 Char_i \times Treated_b \times \mathbb{1}(Expiration)_t \\
&+ \delta_2 Char_i \times \mathbb{1}(Restriction)_t + ... \\
&+ \delta_3 Char_i \times Treated_b \\
&+ \psi_{11} Treated_b \times \mathbb{1}(Restriction)_t + ... \\
&+ \gamma_{t,i} + \gamma_{b,t} + \varepsilon_{b,i,t}\Big) \qquad (3)
\end{aligned}
$$

where $Ownershare_{b,i,t}$ is again $\%Ownershare_{b,i,t}$ and $Char_i$ is the indicator variable for funds with a high-income return, i.e. high dividend distributions. *Treated* is one for banks that are subject to the restrictions and did not already pay out dividends in 2020 or cut their dividends before the announcement. $\gamma_{b,t}$ is a bank times month fixed effect, that controls for all bank time-varying factors.

The results are presented in *Table 6*, column (1). The results indicate that high-income funds started to decrease their investments in affected banks during the announcement and relaxation period. The triple interaction coefficients are statistically significant at the 1% level and negative, and show that the previously classified dividend-paying funds decreased their ownership by 44% more than non-dividend funds during the restriction period. In contrast, the coefficient for the expiration period is statistically insignificant and smaller in magnitude. This indicates that active dividend funds were not reacting that differently compared to non dividend funds.

A detailed insight into the dynamics of the effect can be observed in *Figure 4*, Panel A, which also gives support for the parallel trend assumption for this specification, as the pre-event trends are parallel. *Figure 4*, Panel A shows that the point estimates drop from April 2020 onward and stay slightly negative even after the announcement of the expiration of the policy. The effect is also significant after the ESRB announcement indicating that the policy would be in place for longer, until the relaxation announcement. It is also noteworthy that after the relaxation announcement, the confidence bands of the estimates widened. One explanation for this could be that some dividend funds increased their holdings again, while others did not, which would ultimately increase the dispersion of the estimates. All in all, these results show that dividend-distributing funds reacted to the policy measures stronger than funds on the lower end of the income return distribution, in particular during the periods where dividends were restricted. However, towards the end of the policy measures being in place, the estimates become more noisy, and thus the effect vanishes.

As an additional check, I use the more detailed fund data to verify that the results are driven by active dividend funds and not only differences between the treated and control banks. Exclusively for this analysis, I separately rely on only the treated banks or only the control banks. As passive funds are required to track a benchmark, their ownership adjustments would just be driven by a change in the benchmark constituents. Thus, funds with this passive investment strategy, as defined by the FactSet holdings style of "indexer" and ETFs, can be used as a control group. Treated funds are defined as active dividend funds, i.e. active funds with an income return ranking of below 33, as in the previous analysis. Since passive funds could also have a dividend strategy, I omit passive funds with an income return ranking of above 33. I apply equation 1, where the treatment indicator is 1 for active high-income funds and 0 for passive lower-income funds.

*Table 6* column (2) shows the results for the Eurozone banks using bank times month, and investor fixed effects and fund controls, i.e. net flows and the lagged monthly portfolio return of the fund. The interaction terms show negative coefficients at the 5% level. This corroborates the previous findings and shows that indeed the active dividend funds were reacting to this policy. Additionally, *Figure 4*, Panel B shows the event study estimation for this specification and gives some further insights into the dynamics of the effect. Again, the pre-intervention coefficients indicate parallel trends. The overall pattern is similar to the baseline event study effects evident in *Figure 3*, except for the period from November 2020 to March 2021. Here there is a small upward trend visible, which results in statistically insignificant estimates using the joint confidence bands (for December 2020 to May 2021)[22]. Yet, the aggregate estimates over the time periods show that active dividend funds reacted to the announcement by reducing their investments persistently, which is consistent with previous findings.

Column (3) shows the same specification using only the Swiss banks. Although the point estimates are also negative, they are much smaller and are also insignificant. To check the dynamic effects and to investigate whether Swiss banks simply faced a delayed reaction, *Figure 4*, Panel C shows the event study estimates. Here it becomes evident, that Swiss banks did not see any change during the relaxation period and the expiration period. Only the point estimates for December 2020 to March 2021 experience a stronger decrease. However, they are statistically insignificant. This highlights that funds' ownership at Swiss banks did not change and thus, the estimated effects observed in the previous section seem not to be driven by Swiss banks. These findings also address the issue of spillover effects, i.e. Swiss banks were not seen as a safe haven and therefore investors did not reallocate towards them.

### 3.2.2 Are Some Banks More Affected Than Others?

Given the results in the previous section that high-income fund investors reacted to dividend restrictions by reducing their ownership share, I now take a closer look at whether some banks are more affected than others. Given the evidence documented by Larkin, Leary and Michaely (2017), it could be that banks that smooth their dividend stream are more affected compared to non-smoothers, because funds want to have a stable cash flow to pay cash out themselves. This would highlight the dividend smoothing channel of investors reaction, as dividend restrictions have a strong impact on the smoothness of the cash flow streams to investors. If instead, funds are only interested in the dividend yield, we would expect that banks with higher pre-intervention dividends experience a higher reduction in the ownership of funds. Furthermore, low capitalization or low Price/Book values could also explain the

22. This could be attributed to the possibility of making dividend payments again in 2021. As already mentioned in Section 3.1 there was already some news about this towards the end of November 2020, which could attract some active dividend funds again. Furthermore, treated banks made dividend payments in April and May 2021 which could explain the drop in the consequent periods.

portfolio adjustment of funds if the underlying problem of the exit is instead the free cash flow problem between shareholders and management (Jensen and Meckling, 1976; Jensen, 1986). Lastly, if the dividend restrictions signal to investors that banks are not resilient, one would expect that banks with a lower distance to default or capitalization would experience a higher reduction in the ownership of fund investors.

To test which of the proposed mechanisms is at play, I apply again the triple difference model of equation (3), where I replace $Char_i$ with the below median value of the matched sample of either RelVol, SOA or the dividend yield in the fiscal year 2018, the below median value of the Price/Book, the Tier 1 capital ratio and the logarithm of the Z-score in 2019, respectively.

*Table 7* shows the results for the average effect of $Char_{b,t}$ being the below-median value of either RelVol, SOA or the dividend yield. For the speed of adjustment measure of smoothing, column (1) shows that there is no statistically significant effect for the triple interaction terms during the whole period. For the smoothing measure of RelVol in column (2) there is only a statistically significant effect at the 10% level in the restriction period. Taken together, this indicates that dividend smoothing does not seem to drive the results, since there is no consistent statistically significant effect across the smoothing proxies. Regarding the dividend yield, we would expect that banks with lower dividend yields should have a positive coefficient for the triple interaction term. Column (3) of *Table 7* shows that for the restriction period, the point estimates are negative but statistically insignificant. However, there is a negative significant coefficient for the relaxation period from December 2020 to June 2021. This effect should be taken with caution as the event study plots for this specification in *Figure A6* show that there was already a slight negative trend before the interaction. The monthly estimates are also statistically insignificant using the joint significance bands for the whole event study path. As an additional check, I reestimate the event study regression and interact the treatment and post indicator variables with the continuous variable of the dividend yield of 2019, instead of the indicator variable. The results are displayed in *Figure A6*, Panel D and show that the pre-intervention coefficients are better aligned and yet there is still no statistically significant effect after the policy introduction.

*Table 8* shows the results for banks with low Price/Book values in column (1), low distance to default as measured by $Log(Z-Score)$ in column (2), and low capitalization in column (3). If the agency problem between the shareholder and the management is the driver of the results, one would expect a negative coefficient on the low Price/Book values. Indeed, column (1) shows negative point coefficients, however, they are insignificant. *Figure A6*, Panel A also supports the parallel trend assumption and confirms that the ownership percentages were not changing. Thus, the free cash flow problem seems not to explain the results. Lastly, if investors are reacting only because the dividend restrictions are a negative signal about banks' resilience, one would expect a stronger reduction for banks with a low $Log(Z-Score)$ or capital ratio. Yet, the coefficients for the $Log(Z-Score)$ in column (2) and for the low capital ratio in column (3) have positive signs during the restriction period and the relaxation period. For banks with a lower distance to default, this coefficient is even statistically significant at the 10 % level. This indicates that fund investors were not reacting to a negative signal about banks' resilience.

#### 3.2.3 What Affected Fund Ownership Before The Intervention?

The previous findings suggest that fund investors of banks have a demand for dividends, but not necessarily smooth dividends, and thus reduce their ownership of banks' stocks after the announcement of the dividend restrictions. One drawback of the previous analysis could be that there is not enough variation left to identify the effect of the dividend smoothing due to the small sample size of the matched sample in this analysis, because smoothing measures could not be calculated for all banks. To shed further light on the question of whether fund investors have a higher demand for dividend yield or for smooth dividends, I buttress the analysis by looking at the determinants of fund ownership of European banks before the dividend restriction period. If the decrease was driven by fund investors who want to receive a smooth cash flow stream, I would find a negative impact of the dividend smoothing proxies on fund ownership already before the restriction period. Conversely, if fund ownership is instead driven by the dividend yield, there would be a positive relation between the dividend yield and fund ownership even before the restriction period. To disentangle the two mechanisms, I use a similar approach as Larkin, Leary and Michaely (2017) and regress aggregate fund ownership at the bank level on dividend smoothing proxies, the dividend yield, and other control variables over the period from 2016 to 2019 using the following model:

$$FundShare_{b,t} = exp\Big(\beta_0 + \beta_1 Smooth_{b,t-1} + \beta_2 Div.Yield_{b,t-1} + \delta' X_{b,t-1} + \gamma_c + \varepsilon_{b,t}\Big) \quad (4)$$

where $Smooth_{b,t-1}$ is either $SOA_{b,t-1}$ or $RelVol_{b,t-1}$ of bank $b$ at year $t-1$. $Div.Yield_{b,t-1}$ is the dividend yield of bank $b$ at year $t-1$. $FundShare_{b,t}$ is the ownership share of funds for each bank and year. I control in this setting for lagged investor controls contained in $X_{b,t-1}$. Namely, the Price/Book ratio, the stock return over each last fiscal year as a proxy for momentum, the daily stock price volatility over the last year for risk, the logarithm of total assets at the end of the fiscal year as a measure of size, return on assets as a measure of profitability, and the logarithm of the banks' age in years. On top of these investor controls, I add bank-specific controls, which are the Tier 1 capital ratio as a measure of riskiness and proxy for being affected by regulatory payout restrictions due to insufficient capital, and the loans to deposits ratio as a proxy for banks' business model. Finally, I also include country-level fixed effects $\gamma_c$ to account for the existing time-invariant differences in the ownership structure of banks in each country driven by for example its legal framework. Furthermore, I verify that no bank in the sample received bailout money as these often came with dividend restrictions and would thus bias the results if neglected[23].

The results are presented in *Table 9.* The estimations in columns (1)-(2) use the SOA measure for dividend smoothing, while columns (3)-(4) use RelVol. Column (1) reveals that the only statistically significant relation is between fund ownership and the dividend yield, as well as the previous years' return volatility. Dividend smoothing is not statistically significantly related to fund ownership, although the coefficient's sign is as expected. Using the additional set of controls in column (2) confirms the findings in column (1), although

23. I use the information presented by Tsyplakov et al. (2021) and Homar (2016) to identify banks which received bailout money

the point estimates are slightly lower and the significance is at the 5% level. Here a one percentage point increase in the dividend yield is related to a 10 % increase in the average aggregate ownership of bank stocks by funds. In the specification with RelVol in columns (3)-(4) there is a statistically significant negative effect at the 10% level for the dividend smoothing proxy RelVol. As in columns (1)-(2), the dividend yield and the previous years' return volatility show positive significant coefficients at least at the 5% level, which are similar in magnitude.

All in all, *Table 9* indicates that fund ownership seems to be driven by the dividend yield rather than by the smoothness of the dividends, because there is no consistent significant effect across the smoothing proxies. This corroborates the previous findings and shows that dividend smoothing seems not to be the main motive for fund investors to invest in banks' stocks. Furthermore, it shows that the findings of Larkin, Leary and Michaely (2017) do not hold for non-financial corporations.

## 3.3 Implications of Funds' Reactions On Treated Banks' Equity Values

The impact of dividend restrictions on fund ownership can have broader implications. As shown in *Table 1*, fund investors are a sizeable shareholder group of banks and thus their reaction to the restrictions can have significant stock price implications. The general impact of dividend restrictions on banks' stock prices has been studied by Marsh (2023),Kroen (2022), Hardy (2021), and Andreeva et al. (2023) across different jurisdictions. They all find that the announcement had a negative impact on the stock returns of banks. Unlike the previous approaches, I study how funds' reduction in bank stock holdings had an impact on the stock market's reactions to the dividend restrictions.

To estimate the effect, I follow the standard event study literature to calculate cumulative abnormal returns for events (see e.g. MacKinlay (1997)) using daily data. The events under study are the announcement date and the two stages where the dividend restrictions were relaxed. To identify the relevant event dates, I use FactSet's News 2.0 database to select all news related to the dividend ban[24]. Furthermore, I include interviews given by SSM officials, which also covered information about relaxations of the dividend restrictions that are available on their webpage[25]. This strategy reveals that the announcement on the 27th of March 2020 came as a surprise to the public, since I could not identify news about the SSM's dividend restrictions before the announcement. On the other hand, before the dividend restrictions were officially reduced or completely abandoned, I could identify a couple of news articles and interviews that already indicated a relaxation of the dividend restrictions. The respective dates for the first relaxation in December are as follows: On the 5th of November, Enria pointed towards the wait-and-see strategy regarding the lifting of the restrictions, on the 25th of November 2020, the Financial Times article pointed to the possibility of payouts in 2021, on the 3rd of December 2020 El Confidential mentioned for the first time the limits of the 2021 dividends, and on 15th of December 2020 the official announcement[26]. For the official abrogation of the policy in 2021 the dates are as follows: On the 15th of June 2021, Enria mentioned that the limitations end soon[27], on the 1st of July 2021, Christine Lagarde put in perspective in an ESRB speech the outlook of an end of the measures by September[28], and on the 23rd of July 2021 the official announcement.

To calculate abnormal returns, I use daily stock returns from stock prices adjusted for splits and dividends of the 26 banks from the matched sample in Euro. I subtract the one-month Euribor, transformed to daily returns, to get the excess return $R_{b,t}$ over the risk-free rate. The abnormal returns are then defined as:

$$AR_{b,\tau+t} = R_{b,\tau+t} - E[R_{b,\tau+t}] \tag{5}$$

where $AR_{b,\tau+t}$ is the abnormal return of bank $b$, $t$ days after the event date $\tau$ and $E[R_{b,\tau+t}]$ is the expected stock return. For the three policy changes, I set $\tau$ to the above-mentioned

24. I filtered the news by the keywords "ECB", "European Central Bank" and "dividend" and used them as relevant sources Street Account, Press Releases, Events, Sector focus News, Crunshbase News, and FactSet Flashwire.
25. See: https://www.bankingsupervision.europa.eu/press/interviews/html/index.en.html
26. I focused after the 25th of November only on the news which mentioned a relaxation of the restrictions or included additional information about it.
27. https://www.bloomberg.com/news/articles/2021-06-15/ecb-hopes-to-lift-bank-dividend-restrictions-soon-enria-says?embedded-checkout=true
28. https://www.esrb.europa.eu/news/speeches/date/2021/html/esrb.sp210701~5d14de1059.en.html

event dates under study[29].

$E[R_{b,t}]$ is estimated using the Fama-French three factors from Kenneth French's website[30].

$$E[R_{b,t}] = \hat{\alpha_b} + \hat{\beta_b} Mkt_t + \hat{\gamma_b} HML_t + \hat{\delta_b} SMB_t \tag{6}$$

where the $\hat{\alpha_b}, \hat{\beta_b}, \hat{\gamma_b}, \hat{\delta_b}$ are the estimated coefficients of the Fama-French three factors model run independently on each stock. Since I am looking at EUR returns and European investors, I transform the US dollar Fama-French factors to EUR factors using the approach of Glück, Hübel and Scholz (2020).

For each event, I use an estimation window of 248 trading days to estimate $E[R_{b,t}]$. For the restriction event the window ends on the 25th of March 2020, for the relaxation event it ends on the 2nd of November 2020, and for the relaxation event it ends on the 11th of June 2021. This ensures that the estimation windows are very close to the first announcement date of the three specific events[31]. Cumulative abnormal returns $CAR_{b,-1,1}$ for bank $b$ starting one day before and ending one day after the event days mentioned above are then calculated as follows:

$$CAR_{b,-1,1} = \sum_{t=-1}^{1} AR_{b,\tau+t} \tag{7}$$

These are then used in a cross-sectional regression where I interact the treatment indicator with an indicator variable that is equal to 1 for high fund ownership to test if there is

29. To incorporate possible anticipation effects of the news I start the event windows one day before the news announcement. For the official announcements, I use the event day as starting point since the official announcements were released after market closing.

30. For the matched sample of banks during the estimation period, the Capital Asset Pricing Model (CAPM) only achieved an adjusted $R^2$ of around 0.33 on average using the European market factor of Kenneth French, the three factors model has an adjusted $R^2$ of around 0.45 on average similar to the five factors model. This indicates that the CAPM might not be a good model to explain stock returns in this period

31. Note that this ensures for example that the announcement of the SNB's COVID-19 refinancing facility for banks and the Swiss government's loan guarantee program on the 25th of March are included in the estimation window. These measures would have positively affected Swiss banks' stock returns. See: `https://www.snb.ch/en/mmr/reference/pre_20200325/source/pre_20200325.en.pdf`

a differential effect on the valuations:

$$CAR_{b,-1,1} = \alpha + \beta_1 Treated_i + \beta_2 D_{b,k} + \beta_3 Treated_b \times Fund_b + \beta_4 MktValue_b + \epsilon_b \quad (8)$$

where $Treated_b$ is an indicator variable for being in the treated sample and $Fund_b$ is an indicator variable for the median split share of the percentage of fund owners in February 2020 of the bank, $MktValue_b$ is the market value of the bank in Euro at the beginning of the event.

The results for the different event days are displayed in *Table 10.* Panel A shows the estimates for the average treatment effects of the dividend restrictions on banks' stock returns. The announcement of dividend restrictions, on the 27th of March, shows an statistically insignificant negative point estimate. Although the sign of the estimate is expected, this suggests that the dividend restrictions did not have a negative impact on banks' stock returns. Also, the announcements of the relaxation of the policy, where limited dividend payments were allowed, show no statistically significant impact. Lastly, for the expiration announcement event days there is no statistically significant impact on the two days where the abrogation of the policy was indicated. However, on the official announcement day, there is a statistically positive significant effect of 2.1 percentage points in abnormal returns at the 1 % level.

Panel B focuses on the interaction of the fund ownership share and the average treatment effects. Given the results in the previous section, we would expect a negative impact of fund ownership on the treatment effect. Indeed, the first column in Panel B shows that banks with high fund ownership have 7.5 percentage points lower treatment effect compared to banks with low fund ownership. Taken together with the constant of -1.2, the positive treatment effect estimate of 2.0 and the high fund share estimate of -3.7, these results indicate that the CAR of treated banks with a high fund ownership is around -3.0 percentage points. This indicates that the previously identified reduction in the ownership of funds also has pricing implications for the banks.

For the first relaxation event date, i.e. the 5th of November when the relaxation was first mentioned in the news, there is no statistically significant differential effect by fund owners. This holds also for the news announcement on the 25th of November. However, on the 3rd of December, when the limits of the possible distributions were first mentioned in the news, and also on the official announcement date on the 15th of December, there is again a statistically significant negative coefficient on the interaction term of the treatment indicator and high fund ownership at the 5% level. For the 3rd of December, the treatment effect for banks with a high fund ownership is around 4.7 percentage points lower, resulting in a CAR point estimate of -1.5 for treated banks with high fund ownership. For the official announcement date, the coefficient of the interaction term has a magnitude of around -3.2 percentage points resulting in a negative CAR point estimate for high fund ownership treated banks of only around -0.2 percentage points. This suggests that fund investors were expecting higher payouts in 2021, compared to the payouts allowed by the supervisor.

Lastly, on the days associated with the final abrogation of the policy, i.e. the 16th of June, the 1st of July, and the 23rd of July 2021, only the official announcement date has a significantly different treatment effect for high fund ownership banks at the 5% significance level. Therefore, the treatment effect for banks with high fund ownership is around 3 percentage points lower than for treated banks with low fund ownership. As the point estimates of the CAR for treated banks with a high fund ownership is positive and around 1.8, this indicates that high fund owership banks face a slower stock price recovery.

These results stay similar in magnitude and significance when instead of the 3 Factor model the 5 Factor model is used. This can be seen in Appendix *Table A7.* Furthermore, the results are still consistent even after including the past dividend yield as can be seen in Appendix *Table A7* and *Table A8.* This highlights that unconditional on the dividend yield of last year

The results presented so far suggest that fund investors sold their stocks following the announcement of the dividend restriction, resulting in lower CARs for treated banks with more fund owners. This finding is in line with the long-term decrease in ownership shares for the matched sample, as the negative CAR differential is persistent also for the relaxation and expiration events. In particular, the expiration of the policy should lead to dividend-focusing investors returning to the stock. This holds across the treated banks, as depicted in the significant positive average effect of 2.1 percentage points. Nevertheless, banks with a high share of fund owners continue to exhibit underperformance even under these circumstances. This corroborates with the findings of a persistent reaction of fund investors, as the policy maker could again intrude into the payout policy, which would impede funds from reinvesting in the banks.

## 4 Conclusion

As a response to the 2020 COVID-19 pandemic, regulators around the world restricted banks' dividends to increase banks' resilience. This policy intervention created a laboratory for investigating whether institutional investors of banks' stocks have a demand for (smooth) dividends because the existing literature on institutional investors' dividend demand is mixed. In this paper, I analyzed how banks' investors reacted to the dividend restrictions announced in March 2020 in the Eurozone.

Relying on the quasi-natural experiment set up by the action of the SSM, I detect a decrease in funds' ownership shares in treated banks' stocks, whereas other institutional investors do not change their ownership shares. Results from a matched sample show that this effect seems to be longer-term, leading to a decrease of around 17 percent in November 2020. Regarding the extensive margin, event study results also showed that funds exited treated banks over time. While the restrictions were only temporary, the longer-term decrease in fund ownership shares can be attributed to expectations regarding future payout policy intrusions, which discourage dividend-demanding fund investors. Further evidence on the pre-intervention determinants of funds' ownership indicates that the effect is driven by fund investors' demand for the dividend yield rather than smooth dividends. Therefore, the findings of Larkin, Leary and Michaely (2017) do not seem to hold for non-financial corporations.

The response of funds also had an impact on the equity valuations of banks at the announcements of the policy. Banks with a higher share of fund owners had to a 7.5 percentage points lower treatment effect on their CAR at the initial announcement of the restriction. This negative effect persisted during the announcement of the limited dividend payouts and the abrogation of the policy, implying longer-lasting effects on the equity valuation of treated banks.

These findings also have policy implications. If dividend-demanding fund investors represent a large share of the ownership base of banks, dividend restrictions lead to large drops in the equity valuation of these banks. While the restrictions were advertised to increase the resilience of the banks, this effect puts pressure on banks' stock prices making them less attractive to all investors. The intervention therefore, possibly increases the equity funding costs of the banks during times of crisis, which can add to their fragility. Thus, policymakers should take into account the ownership structure of the banking sector when introducing these policies.

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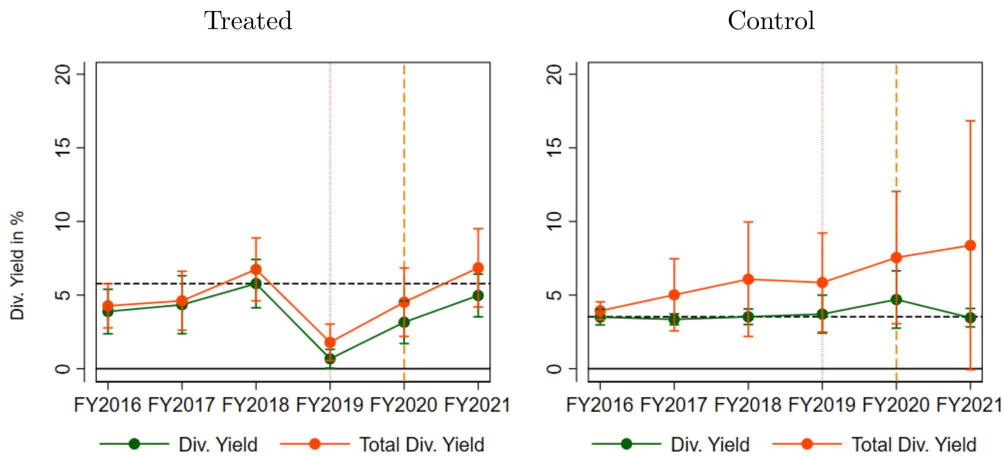
# 5 Figures

**Figure 1**
**Dividend Yields of Treated and Control Banks**

Figure 1 shows the mean dividend yield in percentage points and dividend payout ratios for the control and treated banks over the timer period 2016-2021 for 50 banks. Panel A displays the dividend yield in percentage points, measured by dividends over the fiscal year-end market value of the bank, and the total dividend yield in percentage points, measured by the dividends and repurchases over the fiscal year-end market value of the bank. Panel B displays the dividend payout ratio, measured by DPS over EPS, and the total payout ratio, measured by DPS and Repurchases per outstanding share divided by EPS. Negative payout ratios are excluded. The left-hand side graph displays the values for the treated group, whereas the right-hand side graph displays the values for the control group. The dashed horizontal line indicates the average value of the plotted variable in 2018. The whiskers report the 95% confidence bands of the unconditional means.

**Panel A Dividend Yields**




**Panel B Payout Ratios**

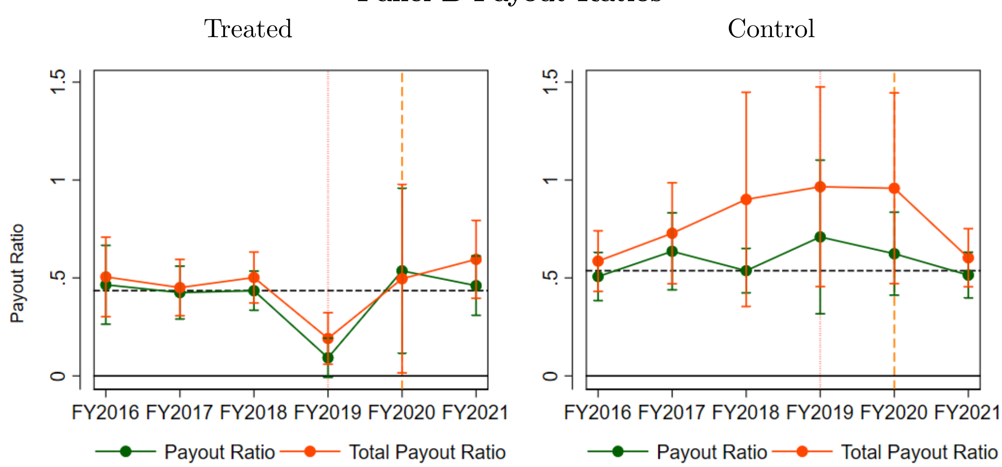


**Figure 2**
**Normalized Bank Dividend Future Response 2020**

Figure 2 plots the ratio of the Euro Stoxx Banks over the Euro Stoxx 50 dividend future indices for different maturities and the volume of the Euro Stoxx Banks dividend future for the year 2021. The dividend future series are normalized to their respective values on the 26th of March 2020. The solid red lines indicate the official announcement dates related to the dividend restrictions, the dashed lines indicate ESRB dividend recommendation and the dotted lines indicate news regarding the dividend restriction relaxation.

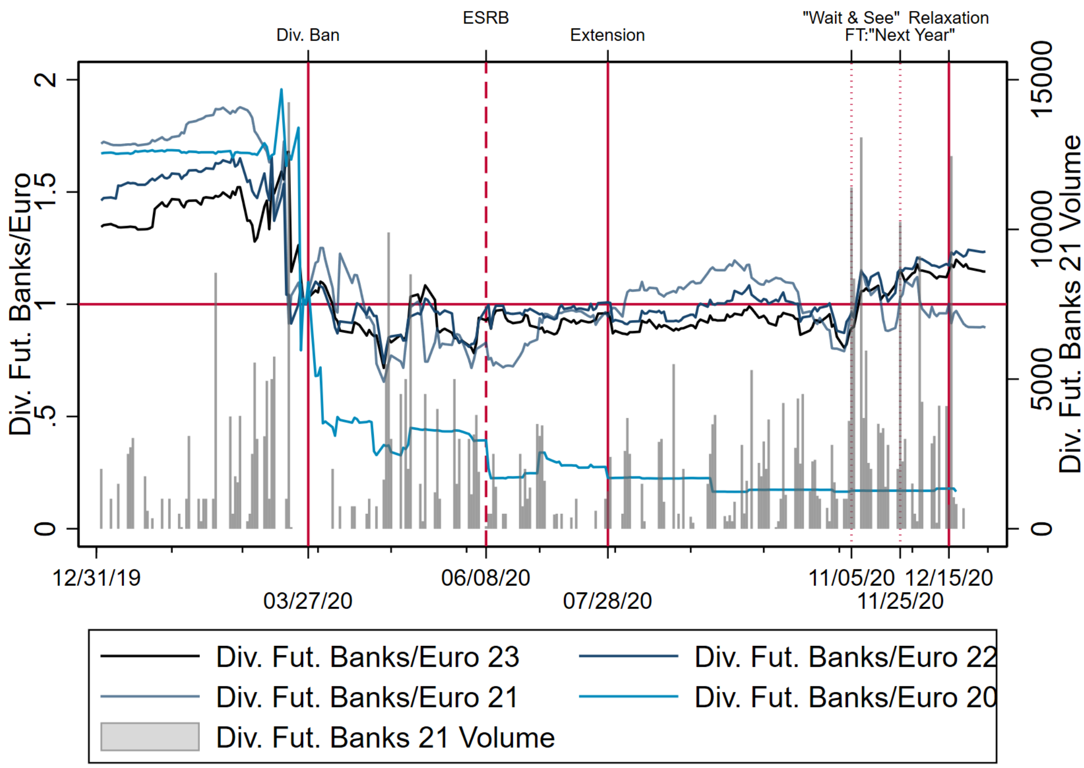
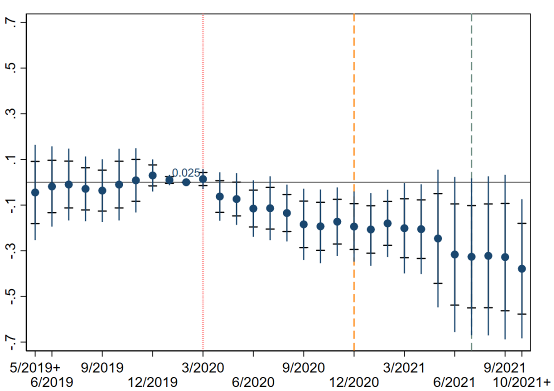


**Figure 3**

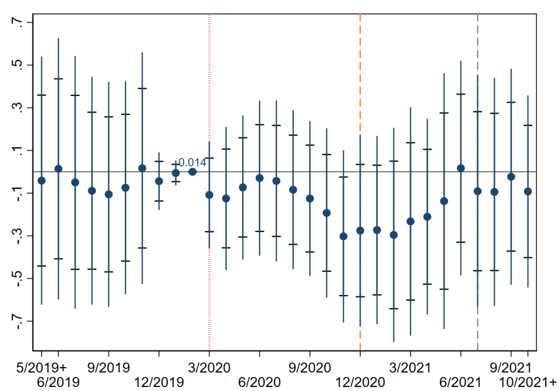
**Event Study Plots: Funds and Institutions Matched**

Panels A and B of Figure 3 plot the evolution of the coefficients $\{\hat{\delta_k}\}$ of Equation (2). Panel A and B show the estimates using the poisson pseudo-maximum likelihood regression on $\%Ownershare_{i,j,t}$ for funds and institutions on the matched sample. Panel C and D show the estimates using a linear probability model on an indicator variable being one if investor $i$ is invested in bank $b$ at time $t$ for the matched sample. The sample includes 26 banks. The regression uses bank and $investor \times month$ fixed effects and controls for the exchange rate to EUR, $FX\ to\ EUR$, and the monthly change in shares outstanding per bank $\triangle_t O.S._b$. The outer bands represent the sup-t 95% confidence bands according to Montiel Olea and Plagborg-Møller (2019), the inner bands are the 95% confidence intervals for clustered standard errors on banks. All coefficients measure the impact compared to February 2020. The average value of the dependent variable in February 2020 is reported above the coefficient of the time. The dotted red line marks the month of the implementation, the dashed orange line marks the relaxation announcement, and the dashed teal line marks the expiration announcement.

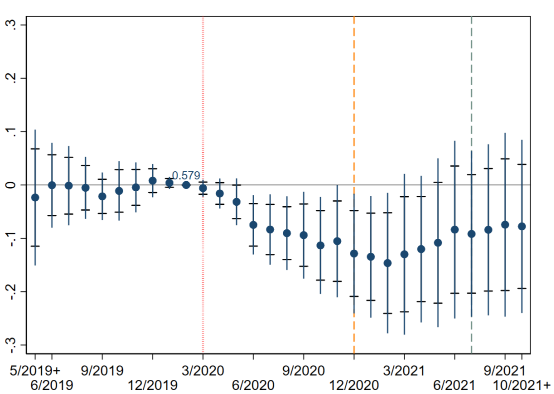
**Panel A. Funds**




**Panel B. Institutions**




**Panel C. Funds LPM**




**Panel D. Institutions LPM**

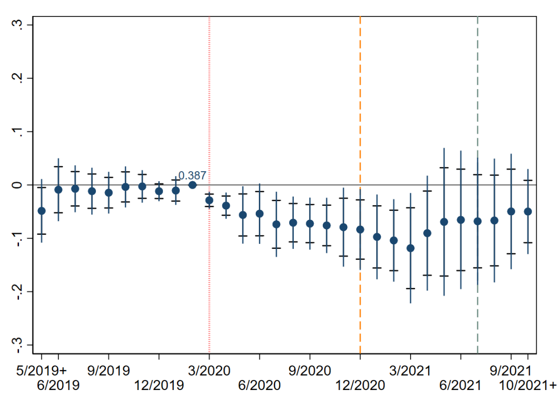
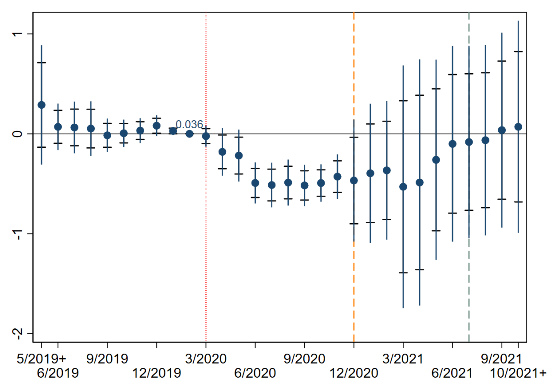


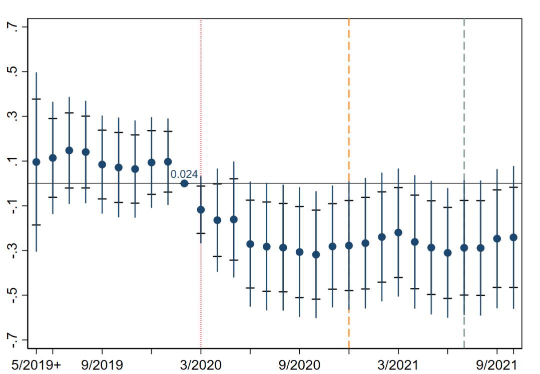
**Figure 4**
**Event Study Plots Investor Dimension**

Panels A of Figure 4 plot the evolution of the coefficients $\{\hat{\delta_k}\}$ of Equation (2) augmented by an additional interaction with high-income return funds for the matched sample. Panel B plots the evolution of the event study specification of *Table 6* colum (2). The sample includes 23 banks for Panel A, 20 treated banks in Panel B, and 23 control banks in Panel C. The regression in Panel A uses $bank \times month$ and $investor \times month$ fixed effects. The regressions in Panel B and Panel C use only investor, $bank \times month$ fixed effects and additionally controls for $FundFlows\ in\ \%$ and $L.MonthlyReturn_i$. The outer bands represent the sup-t 95% confidence bands according to Montiel Olea and Plagborg-Møller (2019), the inner bands are the 95% confidence intervals for clustered standard errors on banks in Panel A and investors in Panel B and C. All coefficients measure the impact compared to February 2020. The average value of the dependent variable in February 2020 is reported above the coefficient of the time. The dotted red line marks the month of the implementation, the dashed orange line marks the relaxation announcement, and the dashed teal line marks the expiration announcement.

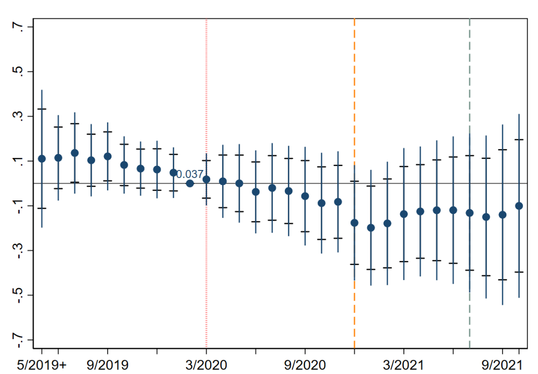
**Panel A. Div Funds**




**Panel B. Eurozone Active vs. Passive**




**Panel C. Switzerland Active vs Passive**



# 6 Tables

**Table 1**
**Descriptive Statistics: Annual Data**

Table 1 shows the mean, standard deviation, minimum, median and maximum of the variables used in this study of the annual bank-level variables over the time period 2016-2019. $\%Inst.$ is the percentage ownership of institutional investors per bank. $\%Fund$ is the percentage ownership of funds per bank. $\%Insider$ is the percentage ownership of insiders and stakeholders per bank. $Price/Book$ is the ratio of the stock price over book equity in percentage points. $Return$ is the stock market return over the last year in percentage points. $Div.Yield$ is the ratio of dividends per share over the market value in percentage points. Vol.Return$_b^d$ is the daily stock price volatility over 270 business days. $Size(Assets)$ is the logarithm of total assets. ROA is defined as net income over average total assets in percentage points. $Log(Age)$ is the logarithm of the banks' age since its inception year. $Tier1\,Cap.\,Ratio$ is defined as the total capital as defined by the latest regulatory and supervisory guidelines divided by total risk-weighted assets as defined by the latest regulatory and supervisory guidelines. $Loans/Deposits$ is defined as the ratio of total gross loans over deposits. $SOA$ is the speed of adjustment estimate, i.e. $\beta$ in (A2), winsorized at the 2.5% level. $RelVol$ is the relative volatility of DPS to EPS as in (A3), winsorized at the 2.5% level.

| | mean | sd | min | median | max | count |
|---|---|---|---|---|---|---|
| $\%Inst.$ | 20.564 | 16.782 | 0.000 | 18.005 | 65.251 | 268 |
| $\%Funds$ | 17.231 | 14.484 | 0.000 | 14.691 | 47.952 | 268 |
| $\%Insider$ | 32.492 | 28.072 | 0.000 | 32.118 | 99.805 | 272 |
| $Price/Book$ | 94.418 | 61.985 | 5.056 | 78.207 | 354.740 | 260 |
| $Return$ | 0.120 | 31.390 | -87.760 | 2.011 | 198.209 | 255 |
| $Div.\,Yield$ | 3.146 | 3.060 | 0.000 | 3.019 | 24.187 | 258 |
| $Vol.\,Return_b^d$ | 1.874 | 1.149 | 0.000 | 1.591 | 7.540 | 261 |
| $Size\ (Assets)$ | 24.703 | 1.986 | 18.458 | 24.773 | 28.403 | 360 |
| $ROA$ | 0.500 | 0.734 | -3.073 | 0.427 | 4.647 | 359 |
| $Log(Age)$ | 4.574 | 0.828 | 1.609 | 4.894 | 6.304 | 328 |
| $Tier1\ Cap.\ Ratio$ | 18.259 | 9.936 | 7.014 | 16.166 | 90.855 | 346 |
| $Loans/Deposits$ | 145.608 | 216.592 | 27.189 | 109.572 | 2428.145 | 337 |
| $SOA$ | 0.542 | 0.444 | -0.173 | 0.559 | 1.507 | 180 |
| $RelVol$ | 1.108 | 1.184 | 0.078 | 0.854 | 6.399 | 172 |

**Table 2**
**Descriptive Statistics: Monthly Data**

Table 2 shows the mean, standard deviation, 1st quartile, median, 3rd quartile, and the number of observations of the monthly variables used in this study per investor group over the period 2018-2021. % of $\%Own._{b,i}$ is the percentage ownership of each investor. $\mathbb{1}(\%Own_{b,i} > 0)$ is an indicator variable that is one is investor $i$ is invested in bank $b$. $Own._{b,i}$ *in mn.* EUR is the EUR amount invested per bank of each investor in millions. $churn_{avg}$ is the one year average of the quarterly churn ratio in 2019 per investor. $Return_b^m$ is the monthly stock return of the bank. $Vol.Return_b^d$ is the banks' daily stock return volatility per month. $\triangle_t$ O.S. is the change in outstanding shares per bank over time. *FundFlows in* % are the monthly net flows to net asset value per fund in each month winsorized at the 1 % level. *Fund Size in bn. EUR* is the total net asset value per fund in billion Euro. $L.MonthlyReturn_i$ is the portfolio return per fund of the previous month. *Income Return Percentile* 2019 is the percentile rank relative to all funds that have the same Morningstar fund Category of the funds holding period return that is attributed to dividend distributions in 2019.

| | mean | sd | p25 | p50 | p75 | count |
|---|---|---|---|---|---|---|
| Fund | | | | | | |
| $\%Own._{b,i}$ | 0.024 | 0.181 | 0.000 | 0.001 | 0.009 | 1705865 |
| $\mathbb{1}(\%Own.b,i > 0)$ | 0.608 | 0.488 | 0.000 | 1.000 | 1.000 | 1705865 |
| $Mio.EURInvested_{b,i}$ | 3.453 | 24.010 | 0.000 | 0.167 | 1.467 | 1693031 |
| *FundFlows in* % | 0.004 | 0.061 | -0.012 | -0.000 | 0.012 | 972846 |
| *Fund Size in bn. EUR* | 2.756 | 15.862 | 0.168 | 0.475 | 1.325 | 1007357 |
| $L.MonthlyReturn_i$ | 0.691 | 4.651 | -1.381 | 1.173 | 3.118 | 895407 |
| *Income Return Percentile* 2019 | 40.692 | 26.039 | 23.000 | 33.000 | 57.000 | 726772 |
| $Return_b^m$ | 0.049 | 11.240 | -5.017 | 0.879 | 6.262 | 1704362 |
| $Vol.Return_b^d$ | 1.949 | 1.185 | 1.250 | 1.645 | 2.230 | 1704653 |
| $\triangle_t O.S._b$ | 0.001 | 0.014 | 0.000 | 0.000 | 0.000 | 1691718 |
| Institution | | | | | | |
| $\%Own._{b,i}$ | 0.020 | 0.232 | 0.000 | 0.000 | 0.001 | 708381 |
| $\mathbb{1}(\%Own.b,i > 0)$ | 0.400 | 0.490 | 0.000 | 0.000 | 1.000 | 708381 |
| $Mio.EURInvested_{b,i}$ | 2.717 | 38.074 | 0.000 | 0.000 | 0.191 | 702758 |
| *FundFlows in* % | -0.008 | 0.029 | -0.010 | -0.001 | 0.001 | 6409 |
| *Fund Size in bn. EUR* | 1.625 | 3.013 | 0.138 | 0.497 | 1.050 | 6555 |
| $L.MonthlyReturn_i$ | 0.726 | 4.492 | -1.172 | 1.097 | 3.055 | 11156 |
| *Income Return Percentile* 2019 | 41.622 | 33.006 | 18.000 | 25.000 | 51.000 | 3967 |
| $Return_b^m$ | -0.047 | 11.139 | -5.166 | 0.750 | 6.154 | 707390 |
| $Vol.Return_b^d$ | 1.933 | 1.165 | 1.249 | 1.640 | 2.214 | 707564 |
| $\triangle_t O.S._b$ | 0.001 | 0.015 | 0.000 | 0.000 | 0.000 | 702222 |
| Total | | | | | | |
| $\%Own._{b,i}$ | 0.023 | 0.198 | 0.000 | 0.000 | 0.006 | 2414246 |
| $\mathbb{1}(\%Own.b,i > 0)$ | 0.547 | 0.498 | 0.000 | 1.000 | 1.000 | 2414246 |
| $Mio.EURInvested_{b,i}$ | 3.237 | 28.857 | 0.000 | 0.050 | 0.985 | 2395789 |
| *FundFlows in* % | 0.004 | 0.061 | -0.012 | -0.000 | 0.012 | 979255 |
| *Fund Size in bn. EUR* | 2.748 | 15.813 | 0.167 | 0.475 | 1.324 | 1013912 |
| $L.MonthlyReturn_i$ | 0.691 | 4.649 | -1.381 | 1.172 | 3.117 | 906563 |
| *Income Return Percentile* 2019 | 40.697 | 26.082 | 23.000 | 33.000 | 57.000 | 730739 |
| $Return_b^m$ | 0.021 | 11.211 | -5.055 | 0.804 | 6.252 | 2411752 |
| $Vol.Return_b^d$ | 1.945 | 1.180 | 1.250 | 1.643 | 2.227 | 2412217 |
| $\triangle_t O.S._b$ | 0.001 | 0.014 | 0.000 | 0.000 | 0.000 | 2393940 |

## Table 3
## Matching Results

Table 3 shows the averages of the matched treated and control group after applying the propensity score matching one year before the policy. $Price/Book$ is the ratio of the stock price over book equity. $Size(Assets)$ is the logarithm of total assets. $Tier1Cap.Ratio$ is defined as the Tier1 capital divided by total risk-weighted assets as defined by the latest regulatory and supervisory guidelines. $SOA$ is the speed of adjustment estimate, i.e. $\beta$ in (A2), winsorized at the 2.5% level. $RelVol$ is the relative volatility of DPS to EPS as in (A3), winsorized at the 2.5% level. $\%Inst.$ is the percentage ownership of institutional investors per bank. $Loans/Deposits$ is defined as the ratio of total gross loans over deposits. $ROA$ is defined as net income over average total assets in percentage points. $WACD_{2019}$ and $WACD_{2020}$ are the yield to maturity of the weighted average cost of debt provided by FactSet in the year 2019 and 2020, respectively.

| Post-Trimming Means | | | | | | |
|---|---|---|---|---|---|---|
| | Diff | p | $Mean_c$ | $N_c$ | $Mean_t$ | $N_t$ |
| $Price/Book$ | 2.007 | 0.879 | 70.841 | 9 | 68.833 | 17 |
| $Size(Assets)$ | -0.722 | 0.259 | 24.589 | 9 | 25.311 | 17 |
| $Tier1Cap.Ratio$ | 1.278 | 0.169 | 18.006 | 9 | 16.728 | 17 |
| $SOA$ | 0.340 | 0.168 | 0.786 | 7 | 0.446 | 13 |
| $RelVol$ | 0.389 | 0.230 | 1.251 | 7 | 0.861 | 12 |
| $\%Inst.$ | -11.895 | 0.121 | 18.572 | 9 | 30.467 | 17 |
| $Log(Z-Score)$ | 1.178 | 0.036 | 6.516 | 9 | 5.338 | 17 |
| $Loans/Deposits$ | -0.023 | 0.909 | 1.166 | 9 | 1.189 | 17 |
| $ROA$ | -0.094 | 0.302 | 0.448 | 9 | 0.542 | 17 |
| $WACD_{2019}$ | -0.401 | 0.559 | 1.264 | 9 | 1.665 | 15 |
| $WACD_{2020}$ | -0.364 | 0.555 | 0.847 | 9 | 1.211 | 14 |

**Table 4**
**Matched Sample: Panel Difference in Difference Results Funds**

Table 4 shows the results from the difference in difference panel Poisson pseudo-maximum likelihood regressions for different fixed effects on $\%Ownershare_{b,i,t}$ for funds. *Restriction* is an indicator equal to one from March 2020 to November 2020. *Relaxation* is an indicator equal to one from December 2020 to June 2021. *Expiration* is an indicator equal to one from July 2021 onwards. *Treated* is an indicator equal to one for banks subject to dividend restrictions. $\triangle_t O.S._b$ is the monthly change in shares outstanding per bank. *FX to EUR* is the exchange rate to EUR for Swiss banks, for other banks, it is 1. $L.Return_b^m$ is the monthly stock return of the previous month of the bank. $L.Vol.Return_b^d$ is the banks' daily stock return volatility of the previous month. Standard errors are clustered on bank. ***, **, and * indicate statistically different from zero at the 1%, 5%, and 10% level of significance, respectively.

| | (1) | (2) | (3) |
|---|---|---|---|
| Restriction x Treated | -0.005 | -0.108** | -0.118*** |
| | (0.059) | (0.043) | (0.044) |
| Relaxation x Treated | -0.002 | -0.203*** | -0.207*** |
| | (0.079) | (0.072) | (0.069) |
| Expiration x Treated | 0.047 | -0.351*** | -0.349*** |
| | (0.084) | (0.117) | (0.117) |
| $\triangle_t O.S._b$ | -0.528*** | -0.809*** | -0.794*** |
| | (0.113) | (0.185) | (0.184) |
| FX to EUR | 0.042 | -2.580*** | -2.499*** |
| | (1.024) | (0.768) | (0.770) |
| $L.Return_b^m$ | | | 0.000 |
| | | | (0.001) |
| $L.Vol.Return_b^d$ | | | 0.027 |
| | | | (0.022) |
| Constant | -3.550*** | 0.697 | 0.566 |
| | (1.006) | (0.753) | (0.758) |
| Observations | 670,682 | 566,646 | 566,646 |
| Investor×Month FE | | X | X |
| Bank FE | X | X | X |
| Month FE | X | | |
| Cluster | Bank | Bank | Bank |
| # Banks | 25 | 24 | 24 |
| # FE | 47 | 108,768 | 108,768 |

**Table 5**

**Matched Sample: Panel Difference in Difference Results Institutions**

Table 5 shows the results from the difference in difference panel Poisson pseudo-maximum likelihood regressions for different fixed effects on $\%Ownershare_{b,i,t}$ for institutions other than funds. *Restriction* is an indicator equal to one from March 2020 to November 2020. *Relaxation* is an indicator equal to one from December 2020 to June 2021. *Expiration* is an indicator equal to one from July 2021 onwards. *Treated* is an indicator equal to one for banks subject to dividend restrictions. $\triangle_t O.S._b$ is the monthly change in shares outstanding per bank. *FX to EUR* is the exchange rate to EUR for Swiss banks, for other banks, it is 1. $L.Return_b^m$ is the monthly stock return of the previous month of the bank. $L.Vol.Return_b^d$ is the banks' daily stock return volatility of the previous month. Standard errors are clustered on bank. ***, **, and * indicate statistically different from zero at the 1%, 5%, and 10% level of significance, respectively.

| | (1) | (2) | (3) |
|---|---|---|---|
| Restriction x Treated | 0.098 | -0.078 | -0.128 |
| | (0.092) | (0.155) | (0.145) |
| Relaxation x Treated | 0.207 | -0.166 | -0.176 |
| | (0.210) | (0.139) | (0.138) |
| Expiration x Treated | 0.331 | -0.043 | -0.040 |
| | (0.234) | (0.173) | (0.173) |
| $\triangle_t O.S._b$ | -0.612* | -0.522** | -0.491** |
| | (0.335) | (0.257) | (0.238) |
| FX to EUR | -0.907 | -1.494 | -1.379 |
| | (2.281) | (2.219) | (2.321) |
| $L.Return_b^m$ | | | -0.000 |
| | | | (0.001) |
| $L.Vol.Return_b^d$ | | | 0.082* |
| | | | (0.042) |
| Constant | -2.513 | 0.267 | -0.000 |
| | (2.195) | (2.186) | (2.302) |
| Observations | 243,631 | 188,998 | 188,998 |
| Investor×Month FE | | X | X |
| Bank FE | X | X | X |
| Month FE | X | | |
| Cluster | Bank | Bank | Bank |
| # Banks | 26 | 26 | 26 |
| # FE | 47 | 28,424 | 28,424 |

**Table 6**
**Investor Dimension: Panel Difference in Difference Results**

Table 6 shows the difference in difference results for the investors' dimension. Column (1) shows the triple difference panel Poisson pseudo-maximum likelihood regressions on $\%Ownershare_{b,i,t}$ of funds for Eurozone and Swiss banks, where $Treated$ is one for banks subject to dividend restrictions. Column (2) shows the panel Poisson pseudo-maximum likelihood regressions on $\%Ownershare_{b,i,t}$ of funds only for Eurozone banks, where $Treated$ is one for non-index dividend funds. Column (3) shows the panel Poisson pseudo-maximum likelihood regressions on $\%Ownershare_{b,i,t}$ of funds only for Swiss banks, where $Treated$ is one for non-index dividend funds. $Restriction$ is an indicator equal to one from March 2020 to November 2020. $Relaxation$ is an indicator equal to one from December 2020 to June 2021. $Expiration$ is an indicator equal to one from July 2021 onwards. $Div.Fund$ is an indicator for funds with a high-income return ranking, i.e. high dividend-paying funds. $FundFlows\ in\ \%$ are the monthly net flows to net asset value per fund in each month winsorized at the 1 % level. $L.MonthlyReturn_i$ is the portfolio return per fund of the previous month. Standard errors are clustered on bank. ***, **, and * indicate statistically different from zero at the 1%, 5%, and 10% level of significance, respectively.

| *Treated :* | EU Banks | Active Dividend Funds | |
|---|---|---|---|
| *Sample :* | Eurozone + Switzerland | Eurozone | Switzerland |
| | (1) | (2) | (3) |
| *Restriction* x *Treated* x *Div.Fund* | -0.578*** | | |
| | (0.136) | | |
| *Relaxation* x *Treated* x *Div.Fund* | -0.585*** | | |
| | (0.187) | | |
| *Expiration* x *Treated* x *Div.Fund* | -0.189 | | |
| | (0.259) | | |
| *Treated* x *Div.Fund* | 0.078 | | |
| | (0.158) | | |
| *Restriction* x *Treated* | | -0.258** | -0.063 |
| | | (0.115) | (0.087) |
| *Relaxation* x *Treated* | | -0.273** | -0.153 |
| | | (0.124) | (0.095) |
| *Expiration* x *Treated* | | -0.286** | -0.173 |
| | | (0.121) | (0.125) |
| *FundFlows in %* | | -0.003 | 0.002 |
| | | (0.002) | (0.002) |
| $L.MonthlyReturn_i$ | | -0.002 | -0.004 |
| | | (0.003) | (0.002) |
| Constant | -1.474*** | -2.100*** | -1.608*** |
| | (0.094) | (0.039) | (0.033) |
| Observations | 157,148 | 200,564 | 59,858 |
| Bank×Month FE | X | X | X |
| Inv.×Month FE | X | | |
| Inv. FE | | X | X |
| Cluster | Bank | Investor | Investor |
| # Clusters | 23 | 589 | 406 |
| # FE | 27,345 | 959 | 1,055 |

**Table 7**
**Matched Sample: Panel Triple Difference Results Dividend**

Table 7 shows the results from the triple difference panel Poisson pseudo-maximum likelihood regressions for different sample splits on $\%Ownershare_{b,i,t}$ of funds. Column (1) uses the median split of the smoothing measure SOA, column (2) uses the median split of the smoothing measure RelVol, and column (3) uses the median split of the dividend yield. *Restriction* is an indicator equal to one from March 2020 to November 2020. *Relaxation* is an indicator equal to one from December 2020 to June 2021. *Expiration* is an indicator equal to one from July 2021 onwards. *Treated* is an indicator equal to one for banks subject to dividend restrictions. Low SOA is an indicator variable for below-median SOA estimates in 2018, i.e. high smoothing. SOA is the speed of adjustment estimate, i.e. $\beta$ in (A2), winsorized at the 2.5% level. Low RelVol is an indicator variable for below-median RelVol estimates in 2018, i.e. high smoothing. RelVol is the relative volatility of DPS to EPS as in (A3), winsorized at the 2.5% level. Control variables are the following: $\triangle_t O.S._b$ is the monthly change in shares outstanding per bank. *FX to EUR* is the exchange rate to EUR for Swiss banks, for other banks, it is 1. $L.Return_b^m$ is the monthly stock return of the previous month of the bank. $L.Vol.Return_b^d$ is the banks' daily stock return volatility of the previous month. Standard errors are clustered on bank. ***, **, and * indicate statistically different from zero at the 1%, 5%, and 10% level of significance, respectively.

| *Char*: | Low SOA<br>(1) | Low RelVol<br>(2) | Low Div. Yield<br>(3) |
|---|---|---|---|
| *Restriction* x *Treated* x *Char* | -0.045 | -0.189* | -0.163 |
| | (0.092) | (0.111) | (0.153) |
| *Relaxation* x *Treated* x *Char* | 0.032 | -0.130 | -0.349** |
| | (0.116) | (0.122) | (0.162) |
| *Expiration* x *Treated* x *Char* | 0.130 | 0.062 | -0.240 |
| | (0.130) | (0.138) | (0.196) |
| *Restriction* x *Treated* | -0.049 | -0.020 | -0.047 |
| | (0.039) | (0.046) | (0.069) |
| *Relaxation* x *Treated* | -0.141** | -0.072* | -0.071 |
| | (0.058) | (0.040) | (0.090) |
| *Expiration* x *Treated* | -0.374*** | -0.338*** | -0.269* |
| | (0.093) | (0.096) | (0.145) |
| Observations | 409,311 | 434,893 | 566,646 |
| Full Controls | Yes | Yes | Yes |
| Investor×Month FE | X | X | X |
| Bank FE | X | X | X |
| Cluster | Bank | Bank | Bank |
| # Banks | 17 | 18 | 24 |

**Table 8**

**Matched Sample: Panel Triple Difference Results Risk**

Table 8 shows the results from the triple difference panel Poisson pseudo-maximum likelihood regressions for different sample splits on $\%Ownershare_{b,i,t}$ of funds. Column (1) uses the median split of the Price/Book ratio, column (2) uses the median split of the Log(Z-Score), and column (3) uses the median split of the Tier 1 Cap. Ratio. *Restriction* is an indicator equal to one from March 2020 to November 2020. *Relaxation* is an indicator equal to one from December 2020 to June 2021. *Expiration* is an indicator equal to one from July 2021 onwards. *Treated* is an indicator equal to one for banks subject to dividend restrictions. *Low Price/Book* is an indicator variable for the Price/Book ratio being below one in December 2019. *Low Tier*1 is an indicator variable for the below-median Tier 1 capital ratio in 2019, i.e. low capitalization. *Low Log*$(Z - Score)$ is an indicator variable for the below-median distance to default in 2019, i.e. high risk. Control variables are the following: $\triangle_t O.S._b$ is the monthly change in shares outstanding per bank. $FX\ to\ EUR$ is the exchange rate to EUR for Swiss banks, for other banks, it's 1. $L.Return_b^m$ is the monthly stock return of the previous month of the bank. $L.Vol.Return_b^d$ is the banks' daily stock return volatility of the previous month. Standard errors are clustered on bank. ***, **, and * indicate statistically different from zero at the 1%, 5%, and 10% level of significance, respectively.

| *Char*: | Low Price/Book (1) | Low Log(Z-Score) (2) | Low Tier1 (3) |
|---|---|---|---|
| *Restriction* x *Treated* x *Char* | -0.083 | 0.224* | 0.126 |
| | (0.159) | (0.115) | (0.143) |
| *Relaxation* x *Treated* x *Char* | -0.121 | 0.084 | 0.165 |
| | (0.147) | (0.140) | (0.163) |
| *Expiration* x *Treated* x *Char* | -0.013 | -0.148 | 0.204 |
| | (0.168) | (0.188) | (0.194) |
| *Restriction* x *Treated* | -0.043 | -0.277*** | -0.165** |
| | (0.073) | (0.094) | (0.075) |
| *Relaxation* x *Treated* | -0.103 | -0.252** | -0.234** |
| | (0.088) | (0.125) | (0.109) |
| *Expiration* x *Treated* | -0.266** | -0.230* | -0.352** |
| | (0.129) | (0.126) | (0.148) |
| Observations | 566,646 | 566,646 | 566,646 |
| Full Controls | Yes | Yes | Yes |
| Investor×Month FE | X | X | X |
| Bank FE | X | X | X |
| Cluster | Bank | Bank | Bank |
| # Banks | 24 | 24 | 24 |

**Table 9**
**Fund Ownership and Dividend Smoothing**

Table 9 displays the estimation results of dividend smoothing on fund ownership from 2016 to 2019. % of Funds is the aggregate ownership share of the fund investor group for bank $b$. SOA is the speed of adjustment estimate, i.e. $\hat{\beta}$ in (A2), winsorized at the 2.5% level. RelVol is the relative volatility of DPS to EPS as in (A3), winsorized at the 2.5% level. Price/Book is the ratio of the stock price over book equity. Return is the stock market return over the last year in percentage points. Div. Yield is the ratio of dividends per share over the market value in percentage points. Size (Assets) is the logarithm of total assets. ROA is defined as net income over average total assets in percentage points. Log(Age) is the logarithm of the banks' age since its inception year. $Vol.Return_b^d$ is the daily stock price volatility over 270 business days. Loans/Deposits is defined as the ratio of total gross loans over deposits. Tier1 Cap. Ratio is defined as the Tier1 capital divided by total risk-weighted assets as defined by the latest regulatory and supervisory guidelines. L. indicates the lag operator. Standard errors are clustered on the bank level. ***, **, and * indicate statistically different from zero at the 1%, 5%, and 10% level of significance, respectively.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| $L.SOA$ | -0.057 | -0.048 | | |
| | (0.171) | (0.160) | | |
| $L.RelVol$ | | | -0.129* | -0.130* |
| | | | (0.074) | (0.076) |
| $L.Price/Book$ | 0.000 | 0.000 | -0.000 | -0.000 |
| | (0.002) | (0.002) | (0.002) | (0.002) |
| $L.Return$ | 0.003 | 0.002 | 0.002 | 0.001 |
| | (0.002) | (0.002) | (0.002) | (0.002) |
| $L.Div.\ Yield$ | 0.109*** | 0.093** | 0.107** | 0.092** |
| | (0.041) | (0.040) | (0.044) | (0.043) |
| $L.Vol.\ Return_b^d$ | 0.179*** | 0.146** | 0.175*** | 0.164** |
| | (0.056) | (0.068) | (0.064) | (0.081) |
| $L.Size\ (Assets)$ | 0.164 | 0.164 | 0.168* | 0.161 |
| | (0.102) | (0.110) | (0.096) | (0.100) |
| $L.ROA$ | 0.130 | 0.127 | 0.181* | 0.255 |
| | (0.103) | (0.170) | (0.100) | (0.199) |
| $Log(Age)$ | 0.249 | 0.402 | 0.225 | 0.339 |
| | (0.237) | (0.275) | (0.212) | (0.262) |
| $L.Tier1\ Cap.\ Ratio$ | | 0.010 | | 0.008 |
| | | (0.012) | | (0.014) |
| $L.Loans/Deposits$ | | 0.002 | | 0.001 |
| | | (0.002) | | (0.002) |
| $Constant$ | -3.209 | -4.190 | -3.085 | -3.679 |
| | (2.522) | (3.094) | (2.426) | (2.854) |
| Observations | 174 | 162 | 165 | 153 |
| Pseudo $R^2$ | 0.526 | 0.553 | 0.520 | 0.541 |
| Cluster | Bank | Bank | Bank | Bank |
| Country FE | X | X | X | X |

## Table 10
## CAR Regressions: Event Days

Table 10 presents the regressions of equation 8 for the three events under study using the matched sample of 26 banks. Each column shows the CAR for a different event date where the event window is set to $[-1, 1]$ and the start date is displayed in the first row. Abnormal returns are calculated using the Fama-French 3 factor model. The regression controls for the market value, $MktValue$. Standard errors are robust. ***, **, and * indicate statistically different from zero at the 1%, 5%, and 10% level of significance, respectively.

| | Restriction | Relaxation | | | | Expiration | | |
|---|---|---|---|---|---|---|---|---|
| Event Window Start: | 03/27/20 | 11/04/20 | 11/24/20 | 12/02/20 | 12/15/20 | 06/14/21 | 06/30/21 | 07/22/21 |
| | | | | **Panel A: Treatment Effects** | | | | |
| *Treated* | -1.459 | -0.545 | -1.418 | 0.164 | 1.106 | -0.527 | 1.045 | 2.113*** |
| | (1.598) | (0.938) | (1.133) | (1.032) | (0.748) | (0.532) | (0.656) | (0.726) |
| *Constant* | -0.017 | -0.228 | -0.133 | 0.344 | -0.903** | 0.366 | -0.532 | -0.302 |
| | (0.951) | (0.799) | (0.795) | (0.444) | (0.396) | (0.331) | (0.527) | (0.516) |
| N | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 26 |
| adj. $R^2$ | -0.009 | -0.064 | -0.036 | -0.007 | 0.068 | -0.051 | 0.008 | 0.155 |
| Controls | X | X | X | X | X | X | X | X |
| | | | | **Panel B: Fund Share** | | | | |
| *Treated* | 1.988 | -1.217 | -0.168 | 2.924 | 2.447* | -0.443 | 1.493 | 3.211*** |
| | (2.273) | (1.096) | (1.994) | (1.993) | (1.183) | (0.883) | (1.268) | (0.980) |
| *High Fund Share* | 3.690 | -0.346 | -3.076* | 0.472 | 2.101** | 0.049 | 1.284 | 2.552** |
| | (2.689) | (1.989) | (1.551) | (0.957) | (1.009) | (0.730) | (0.764) | (0.911) |
| *Treated* × *High Fund Share* | -7.466** | 1.270 | -0.546 | -4.773** | -3.236** | -0.163 | -1.319 | -2.987** |
| | (3.403) | (2.217) | (2.282) | (2.208) | (1.474) | (1.095) | (1.317) | (1.238) |
| *Constant* | -1.222 | -0.067 | 0.198 | -0.162 | -1.471*** | 0.344 | -0.849 | -0.959*** |
| | (0.747) | (0.861) | (0.966) | (0.352) | (0.329) | (0.400) | (0.655) | (0.316) |
| N | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 26 |
| adj. $R^2$ | 0.077 | -0.132 | 0.085 | 0.190 | 0.089 | -0.150 | -0.047 | 0.183 |
| Controls | X | X | X | X | X | X | X | X |

# A Appendices

## Appendix A1 Data

Since some listed institutional investors have associated funds in the FactSet ownership data set, I clean the owner-level data for the fund and institution groups using the investor type as follows: First I change the investor group to "fund" if the type either contains the keyword "fund", "Mutual Fd" or "Private Eq Fd/Alt Invt". Next, I aggregate for each holder group (i.e. *fund*, *institution*, *insider/stakeholder*) the holder type to reduce the number of types. For example, I aggregate the types "Pension Fund", "Pension & Life Product" and "Pension Fund Manager" into *Pension Fund*. Given the particular nature of pension and insurance funds, I exclude them from the fund category in the event study. However, this group does not react to dividend restrictions, as evident in Figure A5, which shows the event study results of pension funds.

The aggregated different investor types for the investor group are listed in Table A1.

Special attention has to be placed on institutional investors that also have funds, as their funds' ownership is included into the institutional ownership. To separate the ownership of funds from other institutional investors, I retrieve for each reported ownership the associated funds of the owner. Next, I match to each reported non-fund owner the associated funds as reported by FactSet and eliminate 13F sub-filers in case an associated fund is connected with two holders. Finally, I subtract the associated funds' amounts from the institutional owners' amounts and replace the institutional owners' amount with zero if the fund amount is larger. This ensures that the institution category captures only institutional investors excluding fund holdings in the monthly data set.

**Table A1**
**Investor Groups Reclassified:**

Table A1 shows the different investor types that are classified into the three investor groups: Funds, Other Institutions, and Insiders/Stakeholders

| Funds | Other Institutions | Insiders/Stakeholders |
|---|---|---|
| Closed-End Fund | Bank Inv. Division | Company |
| Exchange Traded Funds | Broker | Emp. Stk. Owners. Plan/Trust |
| Hedge Fund | Family Office | Government |
| Invest Management Corp. | FoundationEndowment | Individual |
| Non-Public Fund | Insurance Company | Joint Venture |
| Open-End Fund | Insurance Fund | Non-Profit Organization |
| | Investment Adviser | Subsidiary |
| | Pension Fund | Venture Capital Private Equity |
| | Private Banking/Wealth | |
| | Sovereign Wealth Manager | |

**Table A2**
**Descriptive Statistics Dataset: Monthly Data**

Table A2 shows the mean, standard deviation, 1st quartile, median, 3rd quartile, and the number of observations of the additional variables describing the investor ownership dataset. US Filings is an indicator being one if the source of the data comes from US filings. Non 13F Based is an indicator if the source of the investor's ownership does not come from 13F filings. Ratio Treated-Control is the ratio of treated banks an investor is invested in compared to all banks in the sample.

| | mean | sd | p25 | p50 | p75 | count |
|---|---|---|---|---|---|---|
| Fund | | | | | | |
| $USFilings\_i$ | 0.257 | 0.437 | 0.000 | 0.000 | 1.000 | 1705825 |
| $non13FBased\_i$ | 0.959 | 0.199 | 1.000 | 1.000 | 1.000 | 1705865 |
| exposure_treat | 53.999 | 34.679 | 22.581 | 63.636 | 76.923 | 1036338 |
| Insider | | | | | | |
| $USFilings\_i$ | 0.025 | 0.155 | 0.000 | 0.000 | 0.000 | 6799 |
| $non13FBased\_i$ | 0.992 | 0.091 | 1.000 | 1.000 | 1.000 | 19935 |
| exposure_treat | 44.364 | 49.007 | 0.000 | 0.000 | 100.000 | 15294 |
| Institution | | | | | | |
| $USFilings\_i$ | 0.390 | 0.488 | 0.000 | 0.000 | 1.000 | 708200 |
| $non13FBased\_i$ | 0.610 | 0.488 | 0.000 | 1.000 | 1.000 | 708381 |
| exposure_treat | 55.802 | 34.074 | 40.000 | 65.217 | 77.778 | 283297 |
| Total | | | | | | |
| $USFilings\_i$ | 0.296 | 0.456 | 0.000 | 0.000 | 1.000 | 2420824 |
| $non13FBased\_i$ | 0.858 | 0.349 | 1.000 | 1.000 | 1.000 | 2434181 |
| exposure_treat | 54.271 | 34.774 | 22.857 | 63.636 | 77.778 | 1334929 |

**Table A3**
**List of Sample Banks**

Table A3 lists the banks in the sample for the event study analysis and the matched sample. Banks marked with ⋆ were omitted in the event study to have a balanced panel.

| | Full sample | Matched sample | Omitted |
|---|---|---|---|
| AIB Group PLC | Treated | Treated | |
| Aareal Bank AG | Treated | Treated | |
| BAWAG Group AG | Treated | Treated | |
| BNP Paribas S.A. Class A | Treated | | |
| BPER Banca S.p.A. | Treated | Treated | |
| Banca Popolare di Sondrio S.c.p.A. | Treated | Treated | |
| Banco BPM SpA | Treated | Treated | |
| Banco Santander, S.A. | Treated | | |
| Bank of Ireland Group Plc | Treated | Treated | |
| Bank of Valletta P.L.C. | Treated | Treated | |
| Commerzbank AG | Treated | | |
| Credit Agricole SA | Treated | | |
| Deutsche Pfandbriefbank AG | Treated | Treated | |
| HSBC Bank Malta P.L.C. | Treated | Treated | |
| ING Groep NV | Treated | Treated | |
| Intesa Sanpaolo S.p.A. | Treated | Treated | |
| KBC Group N.V. | Treated | Treated | |
| Liberbank SA | Treated | | ⋆ |
| Mediobanca - Banca di Credito Finanziario S.p.A. | Treated | Treated | |
| Nordea Bank Abp | Treated | | ⋆ |
| Nova Ljubljanska banka d.d. | Treated | | ⋆ |
| Raiffeisen Bank International AG | Treated | Treated | |
| Societe Generale S.A. Class A | Treated | | |
| UniCredit S.p.A. | Treated | Treated | |
| Unicaja Banco S.A. | Treated | Treated | |
| Vseobecna uverova banka, a.s. | Treated | | ⋆ |
| Banque Cantonale Vaudoise | Control | | |
| Banque Cantonale de Bale Campagne Kantonalbank-Zertifikat | Control | | |
| Banque Cantonale de Geneve SA | Control | Control | |
| Banque Cantonale du Jura | Control | Control | |
| Basler Kantonalbank Partizipsch | Control | | |
| Bellevue Group AG | Control | | |
| Berner Kantonalbank AG | Control | Control | |
| Cembra Money Bank AG | Control | | |
| Credit Suisse Group AG | Control | Control | |
| EFG International AG | Control | | |
| Glarner Kantonalbank | Control | | |
| Graubuendner Kantonalbank | Control | | |
| Hypothekarbank Lenzburg AG | Control | | |
| Julius Baer Gruppe AG | Control | | |
| Luzerner Kantonalbank AG | Control | Control | |
| ONE swiss bank SA | Control | | |
| St.Galler Kantonalbank AG | Control | Control | |
| Swissquote Group Holding Ltd. | Control | | |
| Thurgauer Kantonalbank | Control | Control | |
| UBS Group AG | Control | Control | |
| Valiant Holding AG | Control | Control | |
| Vontobel Holding AG | Control | | |
| Walliser Kantonalbank | Control | | |
| Zuger Kantonalbank AG | Control | | |

**Figure A1**
**Eurozone Investor Data Coverage**

Figure A1 plots the aggregate investment of Eurozone investors, excluding pension funds and insurance corporations, in listed shares of banks for different datasets. The green line relies on the SHS dataset of the ECB, the orange line relies on data retrieved from FactSet and used in the study, and the blue line relies on data retrieved from FactSet excluding 13F sources that is used in Section 3.2.

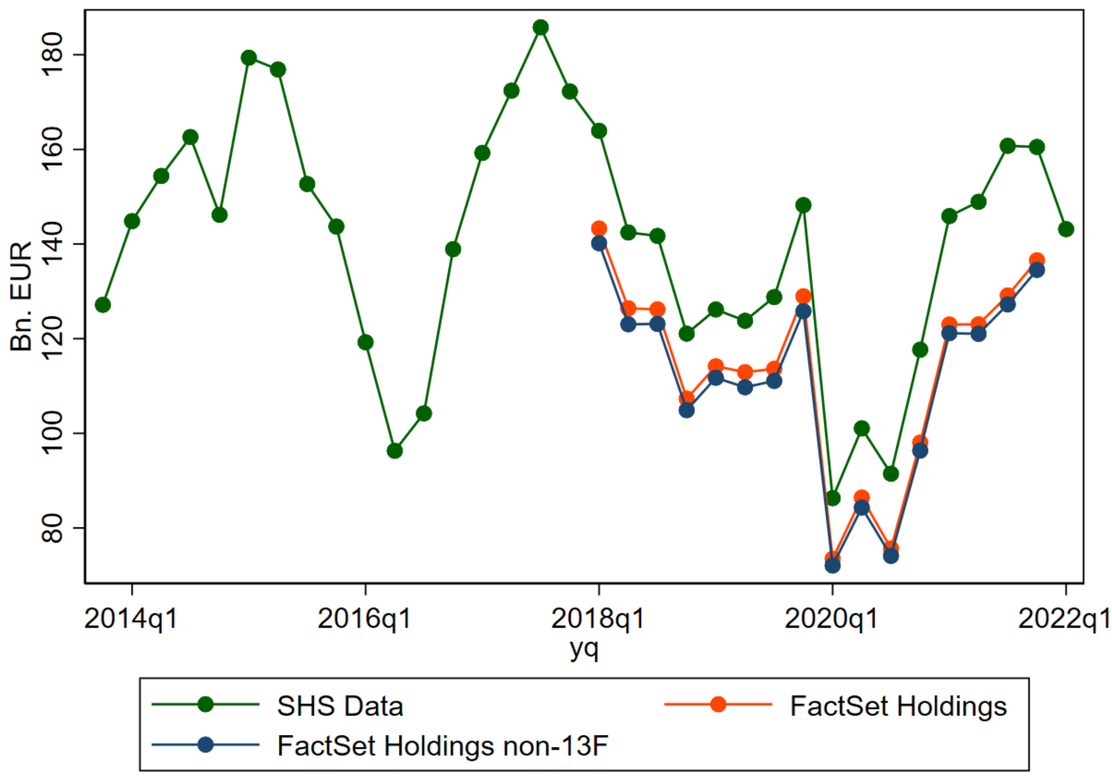
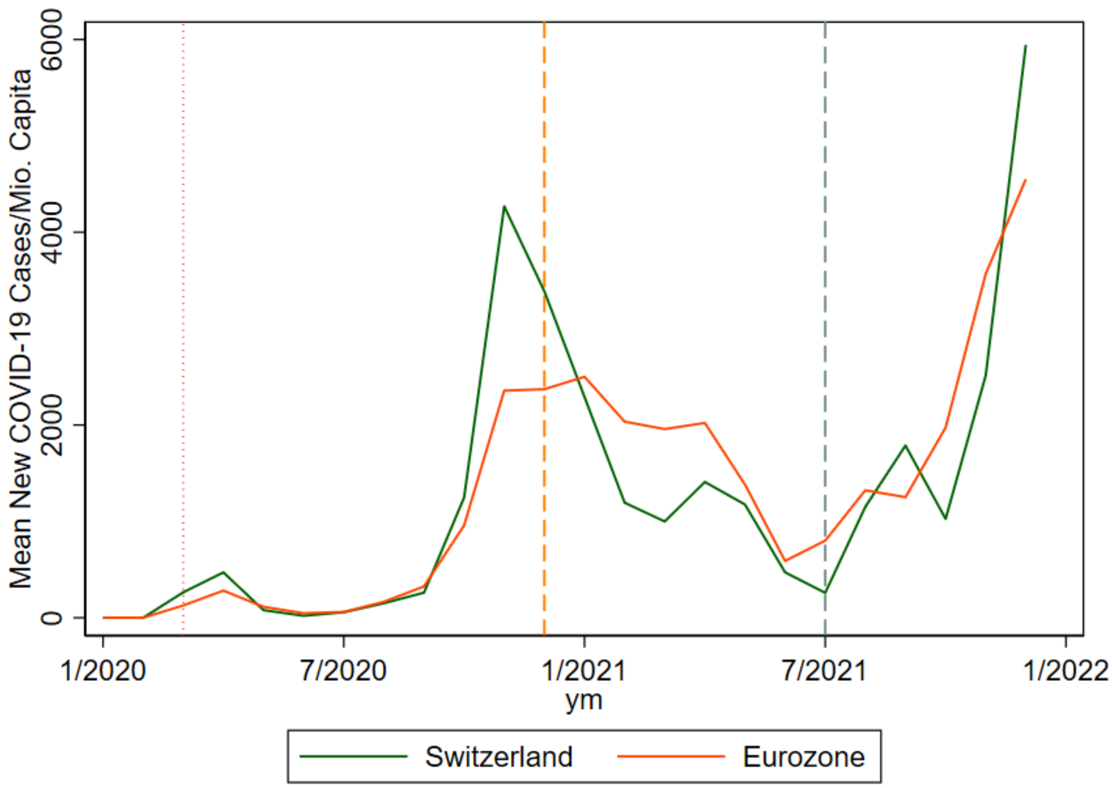


**Figure A2**
**COVID-19 Cases Eurozone and Switzerland**

Figure A2 plots the 7-day smoothed new confirmed COVID-19 cases per million capita for the 19 Eurozone countries and Switzerland. Depicted is always the end of month data. The data is taken from the 'Our World in Data' database available under `https://ourworldindata.org/`.



## Appendix A2 Dividend Smoothing Measures

To measure the dividend smoothing of European banks I rely on the approach of Leary and Michaely (2011). They show that their two measures of dividend smoothing, i.e. speed of adjustment (SOA) and relative volatility (RelVol), can partially offset the small sample bias which is usually an issue for the SOA using the approach of Lintner (1956). Given the short time horizon under study to avoid crisis periods, such an adjustment is necessary for the analysis.

SOA according to Leary and Michaely (2011) is very similar to the classical partial adjustment model of Lintner (1956), where in this case a two-step approach is used. So SOA is defined in a two-step approach according to the following formulae:

$$dev_{i,t} = TPR_{i,t}EPS_{i,t} - D_{i,t-1} \tag{A1}$$

$$\triangle D_{i,t} = \alpha + \beta dev_{i,t} + \epsilon_{i,t}, \tag{A2}$$

where $D_{i,t}$ is dividends per share (DPS) of bank $i$ at time $t$, $EPS_{i,t}$ is the earnings per share (EPS) of bank $i$ at time $t$, $TPR_{i,t}$ is the target payout ratio of bank $i$ at time $t$, and $\epsilon_{i,t}$ is the error term. In the first stage, an estimate of the target payout ratio is needed. This is captured by $TPR_{i,t}$, which is calculated as the median of the payout ratio, i.e. DPS over EPS, from $t-4$ to $t$[32]. In the second stage, equation (A2) is then estimated using rolling regressions, to receive an estimate of the adjustment of the target payout ratio to changes in dividends $\beta$. Using dividends per share in the target payout ratio is in line with the finding that dividends per share are an important proxy for payout policy Brav et al. (2005).

The alternative non-parametric measure of dividend smoothing used by Leary and Michaely (2011) is RelVol which is defined as follows:

$$RelVol = \frac{\sigma_{\eta^d_{i,t}}}{\sigma_{\eta^e_{i,t}}} \tag{A3}$$

Where $\sigma_{\eta^d_{i,t}}$ and $\sigma_{\eta^d_{i,t}}$ are the root mean squared errors of the respective quadratic time trend estimations on DPS and targeted earnings based dividends:

$$D_{i,t} = \alpha_d + \beta_d t + \gamma_d t^2 + \eta^d_{i,t}, \tag{A4}$$

$$TPR_{i,t}EPS_{i,t} = \alpha_e + \beta_e t + \gamma_e t^2 + \eta^e_{i,t} \tag{A5}$$

Therefore, RelVol measures how volatile dividends are relative to the target dividends. These two measures both capture dividend smoothing, but different parts of it. Whereas RelVol captures how volatile dividends are relative to their target, SOA captures how fast dividends adjust to a payout target. So investors who prefer a certain dividend level might prefer lower SOA over lower RelVol, since in the latter case the dividend can still be far away from its target. On the other hand, if investors rather prefer a less volatile income they would select lower RelVol over lower SOA.

To obtain the measures SOA and RelVol I estimate the rolling window regressions of equations (A2), (A4), (A5) using an eight-year window. Similar to Leary and Michaely (2011) I drop observations in the sample where the banks did not yet initiate dividends (i.e. the first observations with zero dividends) and when banks stopped paying dividends (i.e. the last observations with zero dividends). Furthermore, I dropped observations where the $TPR$ was negative and when banks did not pay any dividend in the estimation window. These two measures are then also winsorized at the 2.5% level to eliminate outliers.

32. Leary and Michaely (2011) highlight in a footnote that using only five years for the estimation of $TPR$ instead of ten does not alter the results

## Appendix A3 Additional Results

**Table A4**
**Event Study Regressions: Funds**

Table A4 shows the results from the panel event study regressions for the Poisson pseudo-maximum likelihood regressions and the linear probability model for funds. Only the interaction term coefficients and the controls are reported. $\triangle_t O.S._b$ is the monthly change in shares outstanding per bank. $FX\ to\ EUR$ is the exchange rate to EUR for Swiss banks, for other banks, it is 1. $L.Return_b^m$ is the monthly stock return of the previous month of the bank. $L.Vol.Return_b^d$ is the banks' daily stock return volatility of the previous month. Standard errors are clustered on banks. ***, **, and * indicate statistically different from zero at the 1%, 5%, and 10% level of significance, respectively.

| | $\%Own.b,i$ | $\mathbb{1}(\%Own_{b,i} > 0)$ | $\%Own.b,i$ | $\mathbb{1}(\%Own_{b,i} > 0)$ |
|---|---|---|---|---|
| $2019m6 \times Treated$ | -0.0185 | -0.0004 | -0.0410 | 0.0081 |
| | (0.0585) | (0.0276) | (0.0632) | (0.0285) |
| $2019m7 \times Treated$ | -0.0099 | -0.0013 | -0.0293 | 0.0066 |
| | (0.0523) | (0.0257) | (0.0583) | (0.0244) |
| $2019m8 \times Treated$ | -0.0289 | -0.0052 | -0.0485 | 0.0019 |
| | (0.0472) | (0.0202) | (0.0506) | (0.0197) |
| $2019m9 \times Treated$ | -0.0366 | -0.0213 | -0.0680 | -0.0101 |
| | (0.0457) | (0.0155) | (0.0555) | (0.0160) |
| $2019m10 \times Treated$ | -0.0102 | -0.0111 | -0.0347 | -0.0004 |
| | (0.0522) | (0.0192) | (0.0562) | (0.0205) |
| $2019m11 \times Treated$ | 0.0083 | -0.0045 | -0.0174 | 0.0074 |
| | (0.0468) | (0.0162) | (0.0509) | (0.0185) |
| $2019m12 \times Treated$ | 0.0299 | 0.0081 | 0.0098 | 0.0154 |
| | (0.0234) | (0.0108) | (0.0292) | (0.0113) |
| $2020m1 \times Treated$ | 0.0098 | 0.0039 | 0.0017 | 0.0082 |
| | (0.0076) | (0.0039) | (0.0105) | (0.0053) |
| $2020m3 \times Treated$ | 0.0140 | -0.0059 | 0.0013 | -0.0015 |
| | (0.0146) | (0.0055) | (0.0170) | (0.0060) |
| $2020m4 \times Treated$ | -0.0625* | -0.0159 | -0.0979* | -0.0079 |
| | (0.0354) | (0.0098) | (0.0544) | (0.0133) |
| $2020m5 \times Treated$ | -0.0735* | -0.0316** | -0.0990** | -0.0219 |
| | (0.0377) | (0.0152) | (0.0490) | (0.0144) |
| $2020m6 \times Treated$ | -0.1152*** | -0.0748*** | -0.1386*** | -0.0648*** |
| | (0.0412) | (0.0192) | (0.0516) | (0.0150) |
| $2020m7 \times Treated$ | -0.1138** | -0.0835*** | -0.1548** | -0.0684*** |
| | (0.0466) | (0.0228) | (0.0609) | (0.0153) |
| $2020m8 \times Treated$ | -0.1348*** | -0.0903*** | -0.1658*** | -0.0773*** |
| | (0.0414) | (0.0239) | (0.0480) | (0.0189) |
| $2020m9 \times Treated$ | -0.1843*** | -0.0940*** | -0.2219*** | -0.0781*** |
| | (0.0519) | (0.0282) | (0.0671) | (0.0221) |
| $2020m10 \times Treated$ | -0.1931*** | -0.1133*** | -0.1993*** | -0.1127*** |
| | (0.0537) | (0.0315) | (0.0539) | (0.0304) |
| $2020m11 \times Treated$ | -0.1726*** | -0.1053*** | -0.2025*** | -0.0941*** |
| | (0.0500) | (0.0364) | (0.0601) | (0.0323) |
| $2020m12 \times Treated$ | -0.1940*** | -0.1285*** | -0.2471*** | -0.1063*** |
| | (0.0512) | (0.0388) | (0.0684) | (0.0353) |
| $2021m1 \times Treated$ | -0.2068*** | -0.1345*** | -0.2345*** | -0.1230*** |
| | (0.0530) | (0.0395) | (0.0563) | (0.0357) |
| $2021m2 \times Treated$ | -0.1802*** | -0.1464*** | -0.2053*** | -0.1379*** |

Continued on next page

**Table A4 – continued from previous page**

| | $\%Own.b,i$ | $\mathbb{1}(\%Own_{b,i} > 0)$ | $\%Own.b,i$ | $\mathbb{1}(\%Own_{b,i} > 0)$ |
|---|---|---|---|---|
| | (0.0490) | (0.0456) | (0.0543) | (0.0422) |
| $2021m3 \times Treated$ | -0.2014*** | -0.1299** | -0.2350*** | -0.1156** |
| | (0.0658) | (0.0522) | (0.0632) | (0.0497) |
| $2021m4 \times Treated$ | -0.2054*** | -0.1202** | -0.2121*** | -0.1139** |
| | (0.0654) | (0.0476) | (0.0561) | (0.0454) |
| $2021m5 \times Treated$ | -0.2463** | -0.1083* | -0.2611*** | -0.1014* |
| | (0.1003) | (0.0548) | (0.0963) | (0.0524) |
| $2021m6 \times Treated$ | -0.3165*** | -0.0837 | -0.3330*** | -0.0766 |
| | (0.1131) | (0.0577) | (0.1083) | (0.0566) |
| $2021m7 \times Treated$ | -0.3263*** | -0.0918 | -0.3407*** | -0.0852 |
| | (0.1143) | (0.0537) | (0.1136) | (0.0502) |
| $2021m8 \times Treated$ | -0.3223*** | -0.0840 | -0.3427*** | -0.0764 |
| | (0.1159) | (0.0555) | (0.1105) | (0.0557) |
| $2021m9 \times Treated$ | -0.3278*** | -0.0744 | -0.3509*** | -0.0646 |
| | (0.1199) | (0.0597) | (0.1160) | (0.0564) |
| $\triangle_t O.S._b$ | -0.8063*** | 0.0305 | -0.7892*** | 0.0213 |
| | (0.1910) | (0.0482) | (0.1895) | (0.0458) |
| $FX\ to\ EUR$ | -2.0110** | -0.4195 | -1.7368* | -0.5210 |
| | (0.9649) | (0.4716) | (1.0131) | (0.4704) |
| $L.Return_b^m$ | | | 0.0003 | -0.0003 |
| | | | (0.0006) | (0.0003) |
| $L.Vol.Return_b^d$ | | | 0.0274 | -0.0104 |
| | | | (0.0236) | (0.0070) |
| $pre\ 2019m6 \times Treated$ | -0.0448 | -0.0235 | -0.0737 | -0.0116 |
| | (0.0694) | (0.0441) | (0.0797) | (0.0444) |
| $post\ 2021m9 \times Treated$ | -0.3788*** | -0.0776 | -0.3853*** | -0.0745 |
| | (0.1014) | (0.0562) | (0.0992) | (0.0549) |
| $Constant$ | 0.1563 | 1.0058** | -0.1474 | 1.1179** |
| | (0.9262) | (0.4426) | (0.9849) | (0.4447) |
| Observations | 566,646 | 624,416 | 566,646 | 624,416 |
| ajd.$R^2$ | | 0.271 | | 0.271 |
| Banks | 24 | 24 | 24 | 24 |

## Table A5
## Event Study Regressions: Institutions

Table A5 shows the results from the panel event study regressions for the Poisson pseudo-maximum likelihood regressions and the linear probability model for institutions. Only the interaction term coefficients and the controls are reported. $\triangle_t O.S._b$ is the monthly change in shares outstanding per bank. $FX\ to\ EUR$ is the exchange rate to EUR for Swiss banks, for other banks, it is 1. $L.Return_b^m$ is the monthly stock return of the previous month of the bank. $L.Vol.Return_b^d$ is the banks' daily stock return volatility of the previous month. Standard errors are clustered on banks. ***, **, and * indicate statistically different from zero at the 1%, 5%, and 10% level of significance, respectively.

| | $\%Own.b,i$ | $\mathbb{1}(\%Own_{b,i} > 0)$ | $\%Own.b,i$ | $\mathbb{1}(\%Own_{b,i} > 0)$ |
|---|---|---|---|---|
| $2019m6 \times Treated$ | 0.0140 | -0.0089 | -0.0445 | -0.0065 |
| | (0.2152) | (0.0210) | (0.2166) | (0.0225) |
| $2019m7 \times Treated$ | -0.0495 | -0.0071 | -0.0891 | -0.0055 |
| | (0.2079) | (0.0156) | (0.2160) | (0.0167) |
| $2019m8 \times Treated$ | -0.0888 | -0.0116 | -0.1313 | -0.0102 |

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**Table A5 – continued from previous page**

| | $\%Own.b,i$ | $\mathbb{1}(\%Own_{b,i} > 0)$ | $\%Own.b,i$ | $\mathbb{1}(\%Own_{b,i} > 0)$ |
|---|---|---|---|---|
| | (0.1876) | (0.0156) | (0.1913) | (0.0165) |
| 2019$m9 \times Treated$ | -0.1057 | -0.0144 | -0.1931 | -0.0115 |
| | (0.1853) | (0.0139) | (0.2052) | (0.0159) |
| 2019$m10 \times Treated$ | -0.0747 | -0.0036 | -0.1238 | -0.0019 |
| | (0.1755) | (0.0137) | (0.1820) | (0.0151) |
| 2019$m11 \times Treated$ | 0.0168 | -0.0027 | -0.0275 | -0.0011 |
| | (0.1907) | (0.0109) | (0.1890) | (0.0125) |
| 2019$m12 \times Treated$ | -0.0441 | -0.0117* | -0.0834 | -0.0103 |
| | (0.0474) | (0.0067) | (0.0554) | (0.0074) |
| 2020$m1 \times Treated$ | -0.0057 | -0.0104 | -0.0106 | -0.0099 |
| | (0.0207) | (0.0096) | (0.0205) | (0.0097) |
| 2020$m3 \times Treated$ | -0.1083 | -0.0287*** | -0.1554* | -0.0279*** |
| | (0.0880) | (0.0056) | (0.0814) | (0.0058) |
| 2020$m4 \times Treated$ | -0.1250 | -0.0387*** | -0.3091** | -0.0337*** |
| | (0.1181) | (0.0088) | (0.1453) | (0.0105) |
| 2020$m5 \times Treated$ | -0.0732 | -0.0562*** | -0.1425 | -0.0536*** |
| | (0.1187) | (0.0191) | (0.1300) | (0.0188) |
| 2020$m6 \times Treated$ | -0.0294 | -0.0538** | -0.0968 | -0.0522** |
| | (0.1276) | (0.0201) | (0.1396) | (0.0191) |
| 2020$m7 \times Treated$ | -0.0428 | -0.0737*** | -0.1665 | -0.0706*** |
| | (0.1327) | (0.0217) | (0.1370) | (0.0213) |
| 2020$m8 \times Treated$ | -0.0842 | -0.0707*** | -0.1808 | -0.0681*** |
| | (0.1307) | (0.0175) | (0.1206) | (0.0174) |
| 2020$m9 \times Treated$ | -0.1254 | -0.0724*** | -0.2207* | -0.0696*** |
| | (0.1277) | (0.0173) | (0.1214) | (0.0178) |
| 2020$m10 \times Treated$ | -0.1926 | -0.0758*** | -0.2126 | -0.0754*** |
| | (0.1395) | (0.0184) | (0.1388) | (0.0181) |
| 2020$m11 \times Treated$ | -0.3025** | -0.0791*** | -0.4118*** | -0.0764*** |
| | (0.1418) | (0.0264) | (0.1555) | (0.0259) |
| 2020$m12 \times Treated$ | -0.2754* | -0.0835*** | -0.4146*** | -0.0795*** |
| | (0.1582) | (0.0270) | (0.1601) | (0.0279) |
| 2021$m1 \times Treated$ | -0.2731* | -0.0973*** | -0.3309** | -0.0951*** |
| | (0.1550) | (0.0283) | (0.1477) | (0.0282) |
| 2021$m2 \times Treated$ | -0.2960* | -0.1039*** | -0.3636** | -0.1013*** |
| | (0.1764) | (0.0275) | (0.1714) | (0.0271) |
| 2021$m3 \times Treated$ | -0.2325 | -0.1185*** | -0.3208* | -0.1162*** |
| | (0.1881) | (0.0368) | (0.1833) | (0.0371) |
| 2021$m4 \times Treated$ | -0.2108 | -0.0903** | -0.1872 | -0.0918** |
| | (0.1612) | (0.0383) | (0.2041) | (0.0375) |
| 2021$m5 \times Treated$ | -0.1375 | -0.0692 | -0.1622 | -0.0686 |
| | (0.2107) | (0.0493) | (0.2184) | (0.0492) |
| 2021$m6 \times Treated$ | 0.0168 | -0.0654 | -0.0156 | -0.0645 |
| | (0.1770) | (0.0462) | (0.1725) | (0.0464) |
| 2021$m7 \times Treated$ | -0.0909 | -0.0680 | -0.1180 | -0.0664 |
| | (0.1902) | (0.0424) | (0.1910) | (0.0418) |
| 2021$m8 \times Treated$ | -0.0943 | -0.0665 | -0.1413 | -0.0648 |
| | (0.1880) | (0.0413) | (0.1808) | (0.0412) |
| 2021$m9 \times Treated$ | -0.0231 | -0.0496 | -0.0929 | -0.0479 |
| | (0.1779) | (0.0385) | (0.1738) | (0.0384) |
| $\triangle_t O.S._b$ | -0.5075** | -0.0920 | -0.4880** | -0.0921 |
| | (0.2585) | (0.0540) | (0.2445) | (0.0543) |

Continued on next page

**Table A5 – continued from previous page**

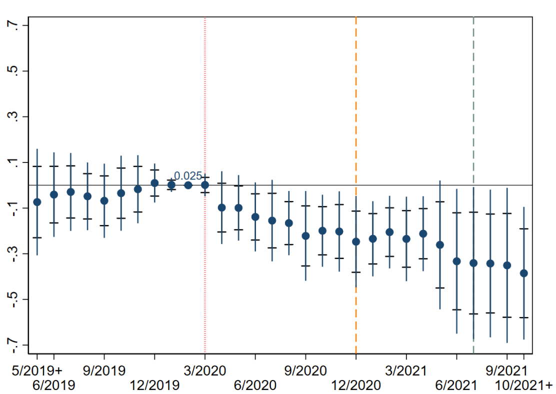
| | $\%Own.b,i$ | $\mathbb{1}(\%Own_{b,i} > 0)$ | $\%Own.b,i$ | $\mathbb{1}(\%Own_{b,i} > 0)$ |
|---|---|---|---|---|
| $FX\ to\ EUR$ | -1.4625 | 0.0275 | -0.9272 | 0.0018 |
| | (2.7265) | (0.4900) | (2.7269) | (0.4979) |
| $L.Return_b^m$ | | | -0.0004 | 0.0000 |
| | | | (0.0010) | (0.0002) |
| $L.Vol.Return_b^d$ | | | 0.0856** | -0.0027 |
| | | | (0.0435) | (0.0044) |
| $pre$ 2019$m$6 × $Treated$ | -0.0413 | -0.0485** | -0.1045 | -0.0458* |
| | (0.2044) | (0.0212) | (0.2018) | (0.0228) |
| $post$ 2021$m$9 × $Treated$ | -0.0922 | -0.0498* | -0.1050 | -0.0494* |
| | (0.1581) | (0.0284) | (0.1551) | (0.0282) |
| $Constant$ | 0.2645 | 0.3981 | -0.3837 | 0.4269 |
| | (2.6058) | (0.4691) | (2.6316) | (0.4781) |
| Observations | 188,998 | 233,048 | 188,998 | 233,048 |
| ajd. $R^2$ | | 0.333 | | 0.333 |
| Banks | 26 | 26 | 26 | 26 |

**Figure A3**

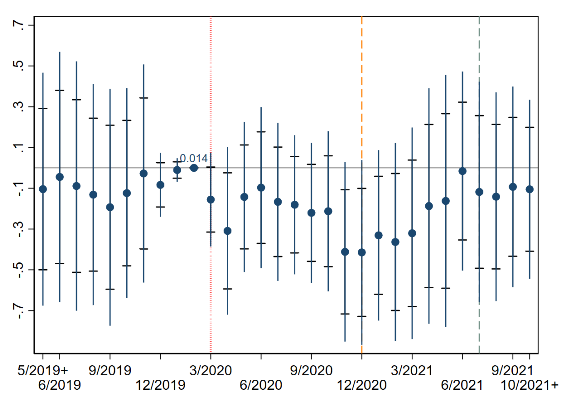
**Event Study Plots: Funds and Institutions Addtional Controls**

Panels A and B of Figure A3 plot the evolution of the coefficients $\{\hat{\delta_k}\}$ of Equation (2) including the return and return volatility controls. Panels A and B show the estimates using the poisson pseudo-maximum likelihood regression on $\%Ownershare_{i,j,t}$ for funds and institutions on the matched sample. Panel C and D show the estimates using a linear probability model on an indicator variable being one if investor $i$ is invested in bank $b$ at time $t$ for the matched sample. The sample includes 26 banks. The regression uses bank and $investor \times month$ fixed effects and controls for the exchange rate to EUR, $FX\ to\ EUR$, the monthly change in shares outstanding per bank $\triangle_t O.S._b$, the past stock return, and the past stock return volatility. The outer bands represent the sup-t 95% confidence bands according to Montiel Olea and Plagborg-Møller (2019), the inner bands are the 95% confidence intervals for clustered standard errors on banks. All coefficients measure the impact compared to February 2020. The average value of the dependent variable in February 2020 is reported above the coefficient of the time. The dashed horizontal line uses January 2020 as a benchmark instead of February 2020. The dotted vertical line marks the month of the implementation, whereas the dashed vertical lines mark the different relief announcements.

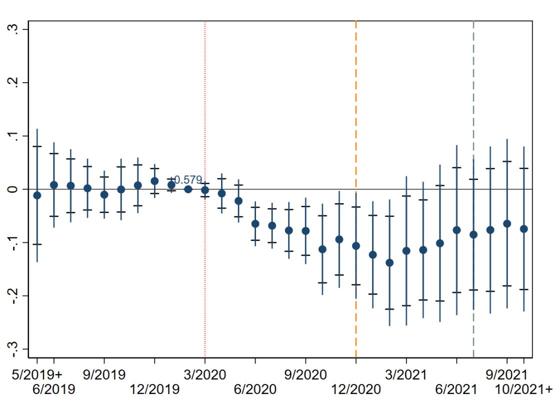
**Panel A. Funds**




**Panel B. Institutions**




**Panel C. Funds LPM**




**Panel D. Institutions LPM**

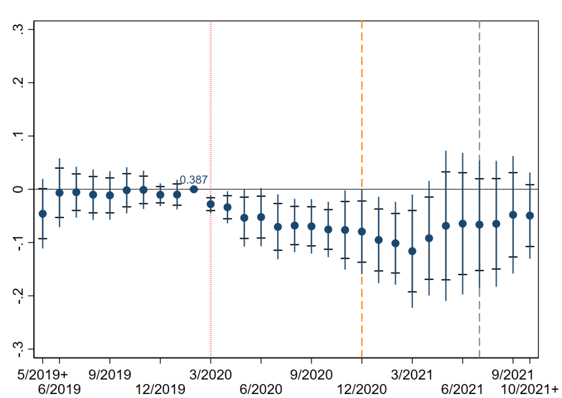
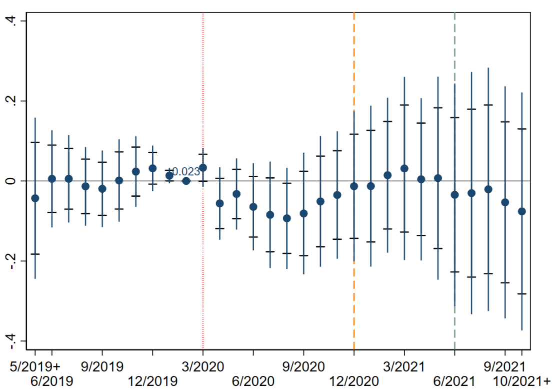


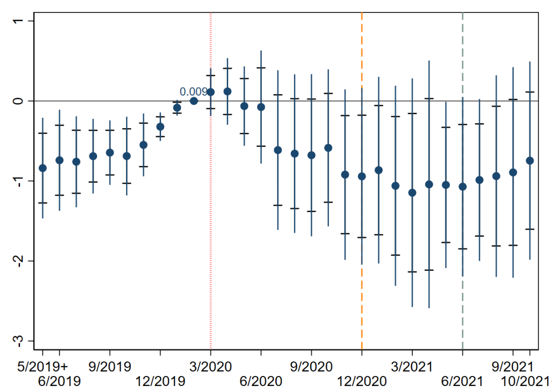
**Figure A4**
**Event Study Plots: Funds and Institutions Unmatched Sample**

Panels A and B of Figure A3 plot the evolution of the coefficients $\{\delta_k\}$ of Equation (2) . Panels A and B show the estimates using the poisson pseudo-maximum likelihood regression on $\%Ownershare_{i,j,t}$ for funds and institutions on the unmatched sample. Panel C and D show the estimates using a linear probability model on an indicator variable being one if investor $i$ is invested in bank $b$ at time $t$ for the matched sample. The sample includes 50 banks. The regression uses bank and $investor \times month$ fixed effects and controls for the exchange rate to EUR, $FX\ to\ EUR$, the monthly change in shares outstanding per bank $\triangle_t O.S._b$. The outer bands represent the sup-t 95% confidence bands according to Montiel Olea and Plagborg-Møller (2019), the inner bands are the 95% confidence intervals for clustered standard errors on banks. All coefficients measure the impact compared to February 2020. The average value of the dependent variable in February 2020 is reported above the coefficient of the time. The dashed horizontal line uses January 2020 as a benchmark instead of February 2020. The dotted vertical line marks the month of the implementation, whereas the dashed vertical lines mark the different relief announcements.

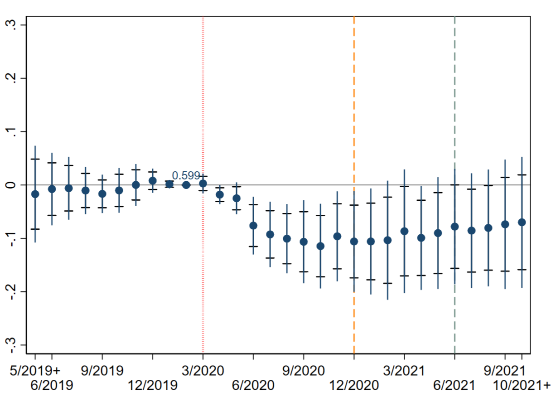
**Panel A. Funds**




**Panel B. Institutions**




**Panel C. Funds LPM**




**Panel D. Institutions LPM**

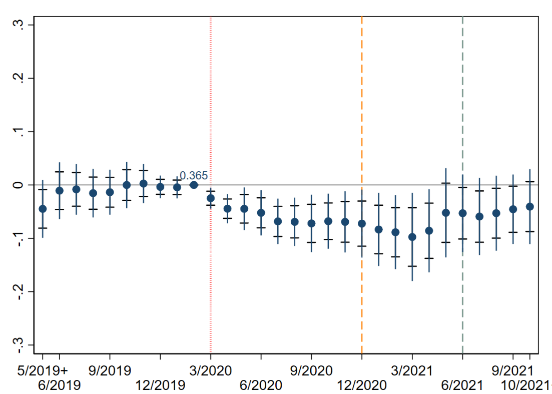
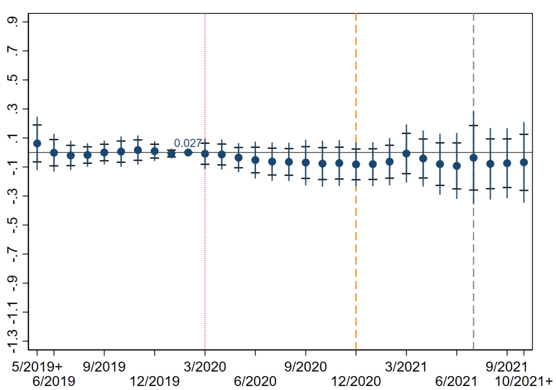


**Figure A5**
**Event Study Plots: ETFs and Pensions**

Panels A and B of Figure A5 plot the evolution of the coefficients $\{\hat{\delta_k}\}$ of Equation (2) show the estimates using the poisson pseudo-maximum likelihood regression on $\%Ownershare_{i,j,t}$ for ETFs and pension funds, respectively. Panel A shows the results for ETFs and Panel B shows the results for pension funds. The sample includes 26 banks. The regression uses bank and $investor \times month$ fixed effects and controls for the exchange rate to EUR, $FX\ to\ EUR$, and the monthly change in shares outstanding per bank $\triangle_t O.S._b$. The outer bands represent the sup-t 95% confidence bands according to Montiel Olea and Plagborg-Møller (2019), the inner bands are the 95% confidence intervals for clustered standard errors on banks. All coefficients measure the impact compared to February 2020. The average value of the dependent variable in February 2020 is reported above the coefficient of the time. The dotted red line marks the month of the implementation, the dashed orange line marks the relaxation announcement, and the dashed teal line marks the expiration announcement.

**Panel A. ETFs**




**Panel B. Pension Funds**

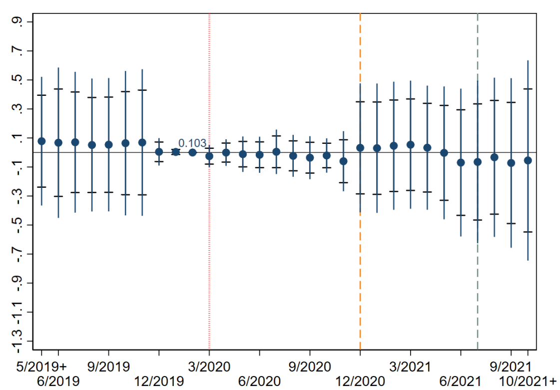
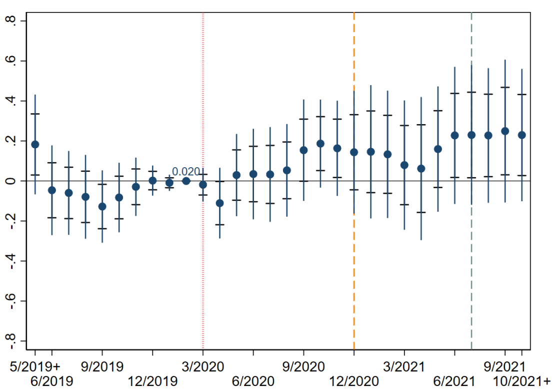


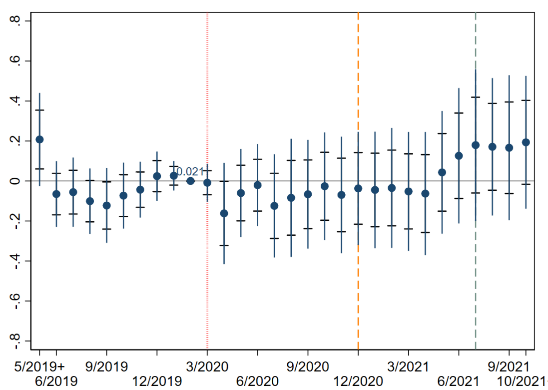
**Figure A6**
**Event Study Plots Triple Difference: Funds Dividend Dimension**

The sample includes 26 banks. The regression uses bank and *investor* $\times$ *month* fixed effects and controls for the exchange rate to EUR, $FX\ to\ EUR$, the monthly change in shares outstanding per bank $\triangle_t O.S._b$, the monthly stock return of the previous month, and the banks' daily stock return volatility of the previous month. Panel A shows the results for the indicator variable of low RelVol 2019, Panel B shows the results for the indicator variable of low SOA in 2019, Panel C shows the results for the indicator variable of low dividend yield in 2019, and Panel D shows the results for the continuous variable of the dividend yield in 2019. The outer bands represent the sup-t 95% confidence bands according to Montiel Olea and Plagborg-Møller (2019), the inner bands are the 95% confidence intervals for clustered standard errors on banks. All coefficients measure the impact compared to February 2020. The average value of the dependent variable on February 2020 is reported above the coefficient of the time. The dotted red line marks the month of the implementation, the dashed orange line marks the relaxation announcement, and the dashed teal line marks the expiration announcement.

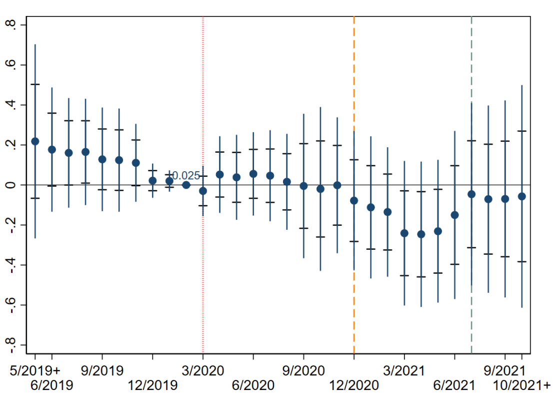
**Panel A. RelVol**




**Panel B. SOA**




**Panel C. Div. Yield**




**Panel D. Div. Yield Continous**

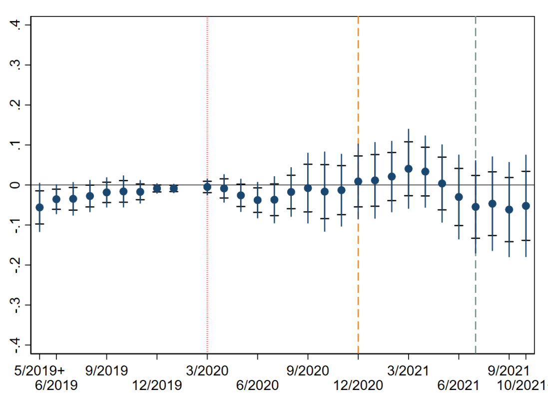
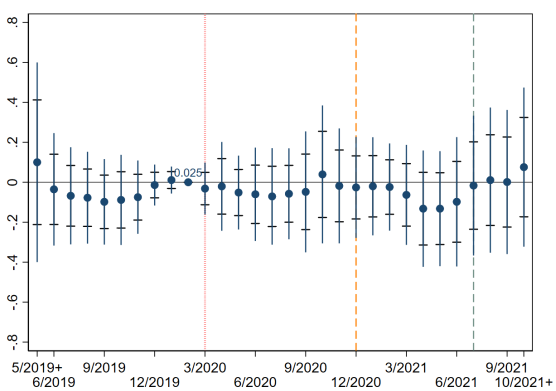


**Figure A7**

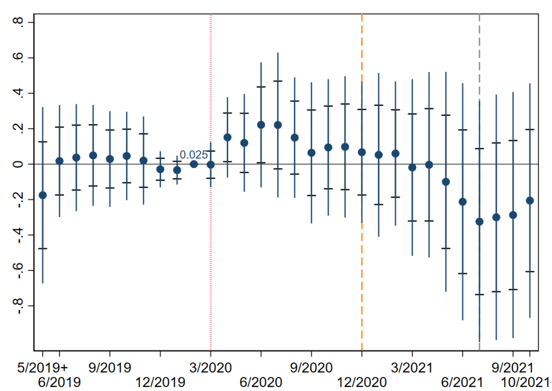
**Event Study Plots Triple Difference: Funds Risk Dimension**

The sample includes 26 banks. The regression uses bank and $investor \times month$ fixed effects and controls for the exchange rate to EUR, $FX\ to\ EUR$, the monthly change in shares outstanding per bank $\triangle_t O.S._b$, the monthly stock return of the previous month, and the banks' daily stock return volatility of the previous month. Panel A shows the results for the indicator variable of low Price/Book values 2019, Panel B shows the results for the indicator variable of low Log(Z-Score) in 2019, Panel C shows the results for the indicator variable of low Tier 1 Cap. Ratio in 2019 The outer bands represent the sup-t 95% confidence bands according to Montiel Olea and Plagborg-Møller (2019), the inner bands are the 95% confidence intervals for clustered standard errors on banks. All coefficients measure the impact compared to February 2020. The average value of the dependent variable on February 2020 is reported above the coefficient of the time. The dotted red line marks the month of the implementation, the dashed orange line marks the relaxation announcement, and the dashed teal line marks the expiration announcement.

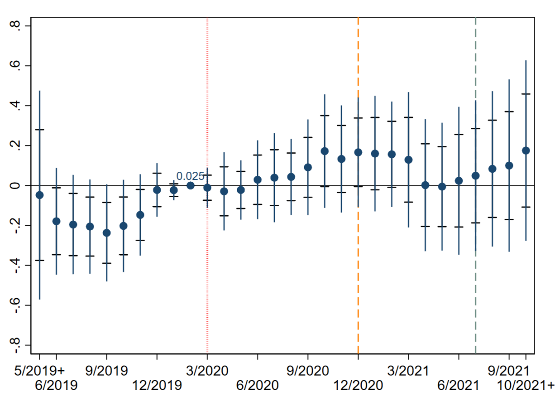
**Panel A. Price/Book**




**Panel B. Log(Z-Score)**




**Panel C. Tier 1 Cap. Ratio**



## Table A6
## CAR Regressions 5 Factor Model: Event Days

Table A6 presents the regressions of equation 8 for the three events under study using the matched sample of 26 banks. Each column shows the CAR for a different event date where the event window is set to $[-1, 1]$ and the start date is displayed in the first row. Abnormal returns are calculated using the Fama-French 5 factor model. The regression controls for the market value, $MktValue$. Standard errors are robust. ***, **, and * indicate statistically different from zero at the 1%, 5%, and 10% level of significance, respectively.

| | Restriction | Relaxation | | | | Expiration | | |
|---|---|---|---|---|---|---|---|---|
| Event Window Start: | 03/27/20 | 11/04/20 | 11/24/20 | 12/02/20 | 12/15/20 | 06/14/21 | 06/30/21 | 07/22/21 |
| | | | Panel A: Treatment Effects | | | | | |
| *Treated* | -0.500 | -0.424 | -1.648 | 0.667 | 0.827 | -0.323 | 1.331* | 1.992** |
| | (1.539) | (1.111) | (1.119) | (0.990) | (0.778) | (0.542) | (0.661) | (0.748) |
| *Constant* | -0.935 | -0.677 | 0.209 | -0.085 | -0.668 | 0.141 | -0.708 | -0.124 |
| | (0.973) | (1.001) | (0.717) | (0.479) | (0.398) | (0.346) | (0.528) | (0.511) |
| N | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 26 |
| adj $R^2$ | 0.057 | -0.030 | -0.028 | -0.048 | 0.127 | -0.063 | 0.049 | 0.110 |
| Controls | X | X | X | X | X | X | X | X |
| | | | Panel B: Fund Share | | | | | |
| *Treated* | 3.482** | -0.790 | -0.482 | 3.213* | 2.252 | -0.212 | 1.765 | 3.196*** |
| | (1.650) | (1.605) | (2.147) | (1.818) | (1.350) | (0.926) | (1.282) | (1.076) |
| *High Fund Share* | 2.436 | -2.399 | -2.519 | 0.825 | 1.528 | -0.261 | 1.217 | 2.624*** |
| | (2.672) | (1.891) | (1.477) | (1.116) | (0.933) | (0.679) | (0.778) | (0.897) |
| *Treated* × *High Fund Share* | -7.752** | 1.824 | -0.682 | -4.595** | -3.094* | -0.074 | -1.266 | -3.197** |
| | (3.019) | (2.312) | (2.408) | (2.129) | (1.562) | (1.086) | (1.337) | (1.320) |
| *Constant* | -2.015** | -0.220 | 0.457 | -0.620 | -1.151*** | 0.174 | -1.009 | -0.810*** |
| | (0.848) | (1.099) | (0.875) | (0.400) | (0.389) | (0.433) | (0.658) | (0.278) |
| N | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 26 |
| adj $R^2$ | 0.252 | -0.076 | 0.034 | 0.132 | 0.146 | -0.156 | -0.008 | 0.144 |
| Controls | X | X | X | X | X | X | X | X |

## Table A7
## CAR Regressions 5 Factor Model Additional Controls: Event Days

Table A7 presents the regressions of equation 8 for the three events under study using the matched sample of 26 banks. Each column shows the CAR for a different event date where the event window is set to $[-1, 1]$ and the start date is displayed in the first row. Abnormal returns are calculated using the Fama-French 5 factor model. The regression controls for the market value, $MktValue$, and the dividend yield of the year before the restrictions, $DivYield2019$. Standard errors are robust. ***, **, and * indicate statistically different from zero at the 1%, 5%, and 10% level of significance, respectively.

| | Restriction | Relaxation | | | | Expiration | | |
|---|---|---|---|---|---|---|---|---|
| Event Window Start: | 03/27/20 | 11/04/20 | 11/24/20 | 12/02/20 | 12/15/20 | 06/14/21 | 06/30/21 | 07/22/21 |
| | | | | Panel A: Treatment Effects | | | | |
| *Treated* | -0.321 | -0.888 | -1.468 | 1.189 | 0.811 | -0.447 | 1.365* | 1.990** |
| | (1.616) | (1.066) | (1.308) | (1.160) | (0.867) | (0.683) | (0.735) | (0.808) |
| $DivYield2019$ | -0.155 | 0.375** | -0.153 | -0.440 | 0.013 | 0.118 | -0.033 | 0.002 |
| | (0.210) | (0.173) | (0.248) | (0.331) | (0.137) | (0.194) | (0.110) | (0.213) |
| N | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 26 |
| adj. $R^2$ | 0.022 | 0.053 | -0.061 | 0.039 | 0.087 | -0.074 | 0.008 | 0.070 |
| | | | | Panel B: Fund Share | | | | |
| *Treated* | 3.647* | -0.520 | -0.457 | 3.088* | 2.357* | -0.108 | 1.755 | 3.251*** |
| | (1.771) | (1.510) | (2.218) | (1.732) | (1.345) | (0.984) | (1.315) | (1.071) |
| *High Fund Share* | 2.522 | -2.137 | -2.500 | 0.708 | 1.627 | -0.188 | 1.210 | 2.664*** |
| | (2.719) | (1.928) | (1.473) | (1.088) | (0.986) | (0.704) | (0.797) | (0.902) |
| *Treated* × *High Fund Share* | -8.610** | 0.298 | -0.812 | -3.923** | -3.656* | -0.582 | -1.216 | -3.472** |
| | (3.388) | (2.266) | (2.591) | (1.832) | (1.790) | (1.243) | (1.431) | (1.339) |
| $DivYield2019$ | 0.286 | 0.474** | 0.041 | -0.210 | 0.175 | 0.167 | -0.017 | 0.091 |
| | (0.355) | (0.181) | (0.215) | (0.267) | (0.171) | (0.210) | (0.114) | (0.234) |
| N | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 26 |
| adj. $R^2$ | 0.238 | 0.054 | -0.013 | 0.116 | 0.130 | -0.147 | -0.057 | 0.110 |
| Controls | X | X | X | X | X | X | X | X |

**Table A8**

**CAR Regressions Additional Controls: Event Days**

Table A8 presents the regressions of equation 8 for the three events under study using the matched sample of 26 banks. Each column shows the CAR for a different event date where the event window is set to $[-1, 1]$ and the start date is displayed in the first row. Abnormal returns are calculated using the Fama-French 3 factor model. The regression controls for the market value, $MktValue$, and the dividend yield of the year before the restrictions, $DivYield2019$. Standard errors are robust. ***, **, and * indicate statistically different from zero at the 1%, 5%, and 10% level of significance, respectively.

| | Restriction | Relaxation | | | | Expiration | | |
|---|---|---|---|---|---|---|---|---|
| Event Window Start: | 03/27/20 | 11/04/20 | 11/24/20 | 12/02/20 | 12/15/20 | 06/14/21 | 06/30/21 | 07/22/21 |
| | | | | Panel A: Treatment Effects | | | | |
| *Treated* | -1.047 | -0.736 | -1.309 | 0.628 | 1.167 | -0.665 | 1.067 | 2.134** |
| | (1.638) | (0.918) | (1.324) | (1.287) | (0.824) | (0.663) | (0.727) | (0.772) |
| $DivYield2019$ | -0.359 | 0.154 | -0.092 | -0.392 | -0.051 | 0.131 | -0.021 | -0.020 |
| | (0.268) | (0.223) | (0.241) | (0.364) | (0.140) | (0.185) | (0.108) | (0.206) |
| *Constant* | 1.027 | -0.671 | 0.136 | 1.476 | -0.754 | -0.016 | -0.472 | -0.244 |
| | (1.434) | (1.117) | (1.169) | (1.285) | (0.603) | (0.691) | (0.619) | (0.768) |
| N | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 26 |
| adj. $R^2$ | -0.016 | -0.082 | -0.078 | 0.036 | 0.028 | -0.053 | -0.036 | 0.117 |
| Controls | X | X | X | X | X | X | X | X |
| | | | | Panel B: Fund Share | | | | |
| *Treated* | 1.945 | -1.157 | -0.084 | 2.858 | 2.488** | -0.338 | 1.492 | 3.242*** |
| | (2.380) | (1.104) | (2.085) | (1.946) | (1.188) | (0.952) | (1.306) | (0.986) |
| *High Fund Share* | 3.667 | -0.287 | -3.010* | 0.411 | 2.140* | 0.123 | 1.283 | 2.575** |
| | (2.710) | (2.032) | (1.468) | (0.958) | (1.050) | (0.791) | (0.777) | (0.938) |
| *Treated* × *High Fund Share* | -7.242* | 0.931 | -0.993 | -4.419** | -3.457* | -0.679 | -1.313 | -3.143** |
| | (3.806) | (2.172) | (2.461) | (2.023) | (1.686) | (1.281) | (1.421) | (1.301) |
| $DivYield2019$ | -0.074 | 0.105 | 0.142 | -0.111 | 0.069 | 0.170 | -0.002 | 0.052 |
| | (0.407) | (0.239) | (0.195) | (0.293) | (0.171) | (0.205) | (0.113) | (0.231) |
| *Constant* | -0.980 | -0.409 | -0.266 | 0.199 | -1.695** | -0.210 | -0.842 | -1.127 |
| | (1.606) | (1.182) | (1.168) | (1.028) | (0.678) | (0.798) | (0.752) | (0.807) |
| N | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 26 |
| adj. $R^2$ | 0.032 | -0.176 | 0.050 | 0.156 | 0.048 | -0.137 | -0.099 | 0.146 |
| Controls | X | X | X | X | X | X | X | X |