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Evaluating the impact of dividend restrictions on euro area bank market values

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Abstract

This paper evaluates the impact of the March 2020 European Central Bank recommendation that banks do not pay dividends or buy back shares on their market values. It documents a causal negative impact on bank share prices of around 7% during the two weeks following its announcement. The recommendation affected the market values of banks directly, by delaying investor cash flows and indirectly, by increasing the uncertainty about future distributions and thus banks' equity risk premia. The impact differed across banks depending on their distribution plans and risk-adjusted profitability. Our analysis highlights the importance of managing perceptions about dividend uncertainty through credible communication about the expected duration, frequency and severity of dividend restrictions to limit their unintended side effects.

JEL codes: G12, G21, G28, G35

Keywords: bank dividends, banking supervision, bank capital, COVID-19 pandemic, bank cost of equity

Non-technical summary

On 27 March 2020 the European Central Bank (ECB) recommended that euro area banks do not pay dividends or buy back shares until at least October 2020. The recommendation concerned dividends to be paid from profits generated in 2019 and 2020. Empirical analyses confirm that the measure was effective overall, preserving bank capital and supporting the flow of bank credit to the real economy. The aim of this paper is to evaluate the impact of the recommendation on banks' market values – the main side effect of the measure – and to shed light on the channels through which this side effect has arisen.

We start by explaining how restrictions on bank dividends affect bank share prices using the standard discounted cash flow model.[1] In this setup, the ECB recommendation could affect banks' market values directly, by delaying dividend cash flows out of 2019 and 2020 profits, as well as indirectly, by increasing the uncertainty around future distributions, manifesting in a higher bank equity risk premium. Furthermore, the impact may differ across banks. First, because the measure directly affects only banks which were expected to pay dividends in 2020 absent of the recommendation. Second, because a mere temporary delay in distributions should not, at least in principle, result in losses if shareholders are adequately compensated for the underlying risks associated with investing in bank shares.

We then evaluate the impact of the ECB recommendation empirically using difference-in-difference regressions, focusing on changes of listed euro area banks' market values around the announcement date of the ECB recommendation on 27 March. We find that the recommendation led to an average decline in bank market values of around 7% relative to those of non-financial firms over the two weeks following the announcements. Most of this impact occurred immediately following the ECB announcement. As expected, the impact differed across banks. We find that banks who were planning to pay dividends lost around 9 percentage points more compared to their peers without a dividend proposal (since only the former group was directly affected by means of delaying planned distributions to shareholders). This impact was less severe for dividend-paying banks which were expected to generate positive shareholder value. We also find a short-lived negative impact on the share prices of non-dividend-paying banks relative to those of non-financial firms, implying that the recommendation resulted in a temporarily elevated

[1] It states that a bank's share price equals the sum of its discounted future cash flows, which come in the form of dividends and share buy backs. The relevant discount rate that equates current price and discounted cash flows is a bank's cost of equity, and consists of the sum of risk-free rates and the equity risk premium.

equity risk premium for the entire banking sector (since the former group was exposed only to the indirect channel, running via elevated uncertainty of payouts, while non-financial firm were not affected either directly or indirectly).

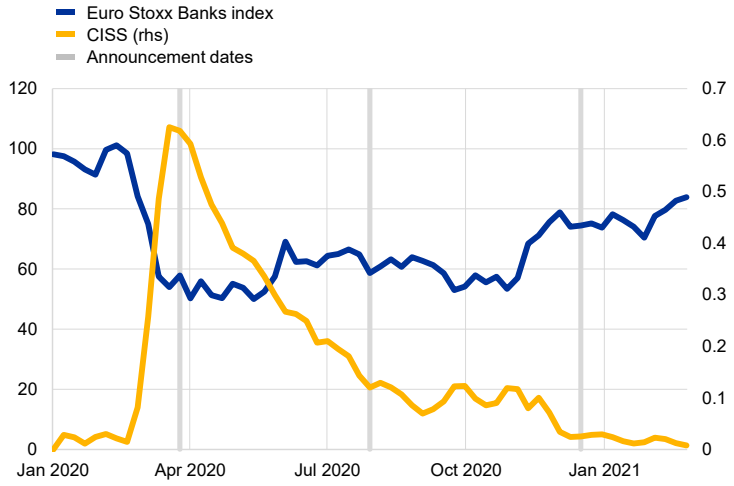
Finally, we complement the micro-econometric results with evidence based on a dividend discount model for the euro area banking sector. Around half of the observed 13% decline in the EURO STOXX Banks index during the week following the announcement can be attributed to the announcement itself, the remaining half reflecting other factors, such as a parallel decline in expected bank profitability and changes in the risk-free rate. Around three percentage points are traced back to the direct effect of delayed investor cash flows, while around five percentage points arise due to the associated increase in bank cost of equity.

Our analysis helps to understand the unintended consequences of such policies and improve their overall efficiency. It is important to clarify that the available empirical evidence convincingly confirms the effectiveness of the ECB recommendation in conserving bank capital and lending capacity. As such we see a delay in investor cash flows as integral for the effectiveness of the measure: it can only work if profits temporarily remain in the banking system, available to absorb losses and support lending. By contrast any associated increase in banks' cost of equity runs against the objective of the measure: it worsens banks' access to new equity capital and – if sustained – can increase the borrowing costs of households and non-financial firms. The overall efficiency of dividend restrictions can therefore improve if this specific side effect is minimized, notably by proactively managing market expectations about the duration, frequency and severity of regulatory interventions in payout decisions. The communication of the December 2020 extension, which clarified that the recommendation would be repealed in September 2021 in the absence of materially adverse developments, effectively included elements of forward guidance aiming to address such concerns.

1 Introduction

On 27 March 2020 the European Central Bank (ECB) recommended that euro area banks do not pay dividends or buy back shares until at least October 2020. The recommendation affected dividends to be paid from profits earned in 2019 and 2020. It was issued in an environment of heightened uncertainty and financial market stress as the first COVID-19 pandemic wave had reached the euro area (see figure 1). The measure aimed to conserve the capital position of euro area banks, boost their resilience and ability to provide funding to households and firms. Most banks subsequently announced that they would follow the recommendation. It was renewed twice: on 28 July and 15 December 2020. Taken together, these extensions prolonged the period over which banks were asked to refrain from paying dividends and share buybacks until September 2021. Finally, on 23 July 2021 the European Central Bank announced the end of restrictions on bank dividends and share buybacks as of the end of September 2021.

Figure 1: EURO STOXX Banks index and the Composite Indicator of Systemic Stress (CISS) around announcement dates of ECB bank payout recommendations



Note: This figure shows the EURO STOXX Banks index and the Composite Indicator of Systemic Stress (CISS). The CISS captures systemic financial stressf (for details see Kremer et al. (2012)). The vertical lines show the announcement dates of ECB dividend recommendations on 27 March, 28 July and 15 December 2020.

This paper focuses on the first announcement, in March 2020, after which euro area bank shares distinctly under-performed the broader market. The aim of this paper is to evaluate the impact of the recommendation on bank market values and to shed light on the channels through which it arose. By construction, the paper focuses only on the main side effect of the ECB dividend recommendation. As shown in other recent analyses, the measure was effective in

meeting its stated objective of preserving bank capital and supporting the flow of bank credit to the real economy during the COVID-19 period (see Dautovic et al. (2021), Belloni et al. (2022) and Katsigianni et al. (2021)).

We start by delineating the channels through which the ECB recommendation could in principle have affected bank share prices based on the discounted cash-flow model, first formally expressed by Williams (1938). In this framework, the current market price of a stock equals the sum of its discounted future cash flows whereby the relevant discount rate is a firm's cost of equity (COE), in turn comprising the equity risk premium and the risk-free rate. In this simple setup the ECB recommendation to retain profits instead of paying out dividends resulted in a delay in investor cash-flows. *Ceteris paribus* banks' market values declined as cash-flows occurring further into the future are subject to stronger discounting. Throughout the paper we will refer to this channel as the direct effect.

However, the ECB dividend recommendation could have also affected bank valuations indirectly. Such an effect can arise as the recommendation may have led to higher perceived uncertainty of future payouts, e.g. if financial market participants were to expect more frequent than originally anticipated supervisory interventions in payout decisions. Risk-averse investors would require a compensation for the additional, sector-specific risk of restrictions on distributions, leading to a higher bank equity risk premium. In this case banks' market values decrease because the discount rate surges. We will refer to this channel as the indirect effect throughout the paper.

We also argue that the recommendation's impact on banks varied depending on their payout plans and capacity to generate shareholder value. First, the measure directly affected only banks which would have otherwise paid dividends in 2020, while it had no bearing on the market values of banks which were not expected to make payouts anyway.[2] Second, we believe that the income generation capacity of the institutions in which funds are temporarily retained is relevant. We argue that shareholders would prefer to receive dividends and invest them elsewhere if the respective bank is expected to generate a return below shareholders' requirements (i.e. if the expected return on equity (ROE) is below a bank's COE). Instead, were shareholders adequately compensated for the underlying risks, a mere temporary delay in payouts should not, at least in principle, result in value losses.[3]

[2]These banks could still have been affected by the recommendation indirectly, through an increased bank equity risk premium.

[3]This argumentation abstracts from other factors, such as taxation.

These conceptual considerations underpin the three hypotheses we set on to evaluate empirically. Our first hypothesis is that the recommendation had a negative impact on euro area banks' market value. More specifically, we evaluate the impact in a difference-in-difference regression setup for a sample of listed euro area banks using listed non-financial corporations (NFCs) as the control group. This allows us to obtain an estimate of the average impact of the dividend restriction on banks' share prices.

Our second hypothesis is that both the direct effect (delay in cash flow) and indirect effect (increase in risk premia for the sector) were relevant for the observed decline in bank valuations. The existence and quantitative importance of these two channels are investigated in two complementary difference-in-difference regressions. First, we focus on the set of euro area banks which were not expected to pay dividends irrespective of the ECB recommendation. This group of institutions can only be affected by the indirect effect, thus evidence of significantly worse stock market returns compared to the control group of NFCs following the recommendation would confirm that bank equity risk premia increased after the recommendation. Second, we evaluate whether banks which would have paid dividends in the absence of the ECB recommendation suffered more sever market value losses than non-dividend-paying banks. This should in principle be the case since both the delay in investor cash flow and increase in bank risk premia affect the valuations of the former, while the latter are affected only by increases in bank risk premia.

Our third and final hypothesis is that the magnitude of the direct effect depended on banks' ability to generate shareholder value as the delay in investor cash flow will only have a negative impact on market values if the reatained equity is expected to generate returns insufficient to compensate shareholders for the underlying risks.[4] To account for this heterogeneity we test whether the share prices of dividend-paying banks expected to generate a ROE in excess of COE were less affected than dividend-paying competitors which are expected to destroy shareholder value.

We find that the ECB recommendation led to an average decline of bank shares of around 7% relative to those of NFCs over the two weeks following the announcement, confirming our first hypothesis. The impact occurred directly following the ECB announcement on 27 March.[5] Moreover, in line with our second and third hypothesis, this average effect masks significant

[4]Put differently, this is equivalent to delaying the current dividends by one period and investing them in the bank. If the ROE generated by this 'investment' exceeds the per-period discount factor, the discounted cash flow model would in fact suggest an increase in market value.

[5]This observation is in line with the efficient market hypothesis which postulates that share prices immediately incorporate all relevant available information (see Fama, 1970; Shiller, 1981).

heterogeneity across banks, depending on their distribution plans and capacity to generate shareholder value. We find that banks who were planning to pay dividends out of their 2019 and 2020 profits lost around 9 percentage points relative to those banks who were not expected to make dividend payments over the period covered by the recommendation. This confirms that the delay in investor cash-flows (i.e. the direct effect) had a significant negative impact. At the same time, the impact was less severe for dividend-paying banks which were expected to generate positive shareholder value. Markets seem to have distinguished between dividend-paying and other banks with a few days delay, when banks publicly announced that they would follow the recommendation. We find a short-lived negative impact also for non-dividend-paying banks, implying that the recommendation resulted in an at least temporarily elevated equity risk premium for the entire banking sector. Overall the initial impact of the recommendation on bank share prices seems to have occurred due to widening bank risk premia, while the direct effect appears to have become relevant only with a slight delay, as market participants were processing bank-specific announcements and assessing to which extent dividend payments would be affected.

Finally, we complement the microeconometric results with sector-level model-based evidence using a three-stage dividend discount model (see Fuller and Hsia (1984)). The results from the dividend discount model suggest that around half of the observed 13% decline in the EURO STOXX Banks index during the week following the announcement can be attributed to the announcement itself, while the remaining half reflects exogenous factors like lower expected bank profitability and changes in the risk-free rate. Around 3 percentage points are traced back to the direct effect of mechanically delayed investor cash flows, while around 5 percentage points arose due to the associated increase in bank equity risk premia.[6]

Our analysis sheds light on the unintended consequences of supervisory dividend restrictions and can help to improve their overall efficiency. We argue that the delay in investor cash flows is central for the effectiveness of the measure: bank capital can only be conserved if bank profits are temporarily retained. In that sense, the direct channel is necessary for the effectiveness of the measure, rendering it an important transmission channel rather than a pure side effect. By contrast, the resulting increase in banks' COE is clearly sub-optimal and runs against the objective of the measure. Elevated bank COE worsens banks' access to external equity capital,

[6]The order of magnitude of the overall impact of the recommendation found in the model-based decomposition corresponds closely to the 7% decline in bank shares due to the recommendation obtained based on the difference-in-difference approach.

and feeds into higher borrowing costs for households and non-financial firms should it become entrenched.

Against this background, we argue that the overall efficiency of dividend restrictions can substantially improve if this specific side effect is minimized. This can be achieved by proactively managing market expectations about the duration, frequency and severity of regulatory interventions in payout decisions. In our view, the communication of the December 2020 extension, which clarified that the recommendation would be repealed in September 2021 in the absence of materially adverse developments already effectively included elements of forward guidance aiming to address such concerns.

Our paper adds to the empirical literature on bank dividends and share repurchases. It is one of the few analyses focusing on supervisory bank dividend restrictions and, to the best of our knowledge, the only study of their impact on market values of euro area banks during COVID-19 period. In a related study focusing on the global financial crisis Acharya et al. (2022) show that the composition of bank capital during the global financial crisis had shifted dramatically from one based on common equity to one based on debt-like hybrid claims. The erosion was exacerbated by continued large-scale dividend payouts, which continued even when banks struggled in anticipation of severe credit losses. The authors further investigate equity and debt price changes around dividend change announcements to distinguish between two possible explanations why banks did not cut dividends or even increased them. For commercial banks they conclude that price changes are consistent with the signaling hypothesis, whereby bank managers maintain or increase dividends to signal positive news about the firm. However, for investment banks the authors conclude that price changes are consistent with a risk shifting hypotheses, whereby dividend payments increase leverage and thus shift risks from owners to creditors and taxpayers. The authors conclude their paper with a recommendation for the early imposition of regulatory sanctions against payouts of dividends to forestall greater problems with capital erosion in the future in case of a foreseeable weakening of macroeconomic conditions.

Hirtle (2014) also investigates dividend payments by large U.S. bank holding companies during the global financial crises, also taking share repurchases into account. The latter are typically made more irregularly over time and, unlike dividend payments, without public announcement at the time they are executed. Like Acharya et al. (2022) the author finds that banks kept paying dividends during the crises even as large losses accumulated. But in contrast she also finds that share repurchases dropped sharply in the early part of the crises. This finding is in line with a

precautionary view of bank capital, in which banks were trying to retain capital through reduced repurchases but also tried to avoid signaling weakness by maintaining dividends. The finding is less consistent with the risk shifting hypotheses, as this would also have been accomplished by share repurchases.

Floyd et al. (2015) compare payout policies of US industrial firms and banks over a longer, 30-year, period. They find that banks are generally more likely to pay dividends and that their payments are more stable over time compared to those of industrial firms. The authors also confirm previous findings that banks resisted cutting dividends as the financial crisis of 2007-2008 begun and point out that in 2008 aggregate bank dividends exceed earnings by 30%. At the same time repurchases were swiftly reduced. The authors stress the importance of bank dividends as a signaling device about bank solvency, while also pointing out that repurchases are less useful as signals, as they do not involve an ongoing commitment and are harder to track for investors. The authors conclude that bank's reluctance to cut dividends is explained by their need to signal financial strength and argue against the risk shifting hypothesis.

These three papers differ from our study in that they analyze mostly US banks and the global financial crisis, when payouts by banks which were mostly unaffected by sector-wide regulatory policies[7]. The ECB dividend recommendation in March 2020 asked banks to refrain from payouts until further notice, and was duly followed by most banks, effectively taking away any decision power over payouts from bank managers and shareholders. This limited potential risk shifting, but also ruled out that banks could use dividend payments as a signaling device.

The remainder of this paper is structured as follows: section 2 outlines the institutional setup in which the ECB recommendation took place and discusses the channels through which dividend restrictions can affect bank market values. Section 3 then explains our identification strategy, including the difference-in-difference regressions setup and underlying data set. Section 4 contains our main set of results, presenting descriptive evidence followed by a formal impact assessment using difference-in-difference regressions. We then move on to a complementary analysis quantifying the channels through which the ECB recommendation affected euro area bank market values using a dividend discount model of the euro area bank sector in section 5. Finally, section 6 discusses the policy implications of our analysis and concludes.

[7]US banks that received bail outs under the Capital Purchase Programme could not increase dividends but also did not have to reduce existing dividends

2 Institutional setup and theoretical considerations

The COVID-19 pandemic reached the euro area in early 2020, causing one of the deepest contractions in recent history. It triggered an abrupt, broad-based and at times disorderly tightening of financing conditions; financial system stress surged notably (see European Central Bank, 2020). Fiscal, monetary and prudential policy-makers responded with a comprehensive set of measures, aiming both to soften the impact of the pandemic on short-term economic growth and to preserve long-term productive capacity. Among others, measures aimed to ensure that financial intermediaries continue providing credit to euro area firms with increased liquidity needs as strict lockdowns had resulted in a sharp decline in revenues for entire sectors. Euro area banks' lending capacity benefited from fiscal guarantees on new loans, a reduction in regulatory capital requirements and operational relief (see Falagiarda et al., 2020; Couaillier et al., 2021). This extraordinary support to the banking system was flanked with restrictions on bank distributions, aiming to make sure that bank capital was retained in the system, available to support new loan origination and absorb potential losses.

More specifically, on Friday 27 March 2020 the ECB recommended that euro area banks do not pay dividends or buy back shares until at least October 2020. The recommendation concerned dividends to be paid from profits generated in 2019 and 2020. Subsequently the ECB renewed its request that banks exercise extreme prudence with dividends and share buybacks twice before its final expiry at the end of September 2021. The first extension, on 28 July, asked banks to refrain from paying dividends and buying back shares and to exercise extreme moderation regarding variable remuneration until January 2021. The second, on 15 December, prolonged the request until September 2021 yet allowed profitable banks with robust capital trajectories to make distributions amounting to no more than 15% of accumulated profit for 2019-2020 or no more than 20 basis points in terms of their common equity tier 1 (CET1) ratio, whichever amounts to the lower amount. Importantly, on this occasion, the ECB signalled that in the absence of materially adverse developments, it intended to repeal the recommendation in September 2021 and return to assessing banks' capital and distribution plans based on the outcome of the normal supervisory cycle.

ECB recommendations are not binding regulations for banks but could rather be understood as a form of moral suasion. Nevertheless, most euro area banks announced that they would follow the recommendation either immediately during the weekend following the announcement,

or during the week thereafter.[8]

We argue that restrictions on dividend distributions can affect share prices and delineate the two channels using the standard discounted cash-flow model. It states that current stock prices equal the sum of all discounted future cash flows:

$$P_0 = \sum_{t=0}^{+\infty} \frac{D_t}{(1+r)^t}, \quad t = 0, 1, 2, 3, ... \tag{1}$$

where P_0 is the current stock price, D_t is the expected future cash flow in period t, and r is the respective discount rate which equates both sides of the equation. The discount rate captures the return that an investor demands for purchasing a firms' equity, i.e. its COE. The discount rate can be expressed as the sum of the risk-free rate and an equity risk premium, both of which can vary over time. The equity risk premium is in general higher for riskier firms or sectors and fluctuates with general investor risk aversion.[9]

Dividend restrictions such as the one announced for euro area banks in March 2020 can influence share prices through two distinct channels. In this regard it is important to note that the recommendation implies a delay in cash flows as dividends which would have been otherwise paid out in the current period are retained as long as the restriction applies. That said, even a mere delay of payouts will have a negative impact on share prices as long as the discount rate is greater than zero. For expositional simplicity, let us assume that a restriction is imposed in period $t = 0$ and applies for one period. In this case the net present value of dividends planned for $t = 0$ falls from D_0 to $\frac{D_0}{1+r}$. This captures the mechanical, *direct* effect of the recommendation.

In addition, dividend restrictions can have an impact on the equity risk premium of affected firms and lead to changes in market values beyond those implied by changes to the timing of dividend payouts. The equity risk premium could increase in particular if investors perceive future dividend payments to be more risky, for instance due to uncertainty about the duration of payout restrictions, or expectations of more intrusive than originally anticipated supervisory interventions in payout decisions also in the future. Such increases in the equity risk premium lead, *ceteris paribus*, to a decline in net present value because future cash flows are discounted

[8]The European Banking Federation supported payout restrictions on 27 March. Individual banks confirmed they would follow the recommendation, too. For example, Bankia and Banco Santander announced their plans to follow with the recommendation on 27 March, ABN AMRO, ING, Unicredit and Rabobank over the 28-29 March weekend, Commerzbank on 30 March, and Crédit Agricole on 2 April.

[9]Damodaran (2021) gives an intuitive introduction into issues surrounding estimation and application of equity risk premia.

at a higher rate. We refer to this as the *indirect* effect of the recommendation.

Finally, as argued earlier, the overall impact of the dividend recommendation can vary across banks, depending on their payout plans and income generation capacity. For example, the *direct* effect (delay in payouts) is likely to be very limited for banks expected anyway to make limited payouts over the duration of dividend restrictions and it is irrelevant in case of no planned dividends. For this set of firms only the *indirect* effect - implying stronger discounting of cash flows occurring after the expected end of the dividend restriction - matters.

In a similar vein, it is important to recall that retained dividends can absorb losses or be put to productive use and generate shareholder value. In the simple discounted cash flow representation this corresponds to investing the retained dividends at the bank's next period ROE, which we denote with ROE_1. Taking that into account, a delay of payouts from $t = 0$ to $t = 1$ would imply that instead of D_0 today investors will receive $D_0(1 + ROE_1)$ in one year. The net present value of the bank in this case remains unchanged whenever $ROE_1 = r$, increases for banks which generate shareholder value and declines otherwise.

In line with this logic, let $P_0^{'}$ and $r^{'}$ denote the share price and discount rate just after the announcement. It follows:

$$P_0^{'} = \frac{D_0(1 + ROE_1)}{1 + r^{'}} + \sum_{t=1}^{+\infty} \frac{D_t}{(1 + r^{'})^t} \tag{2}$$

Subtracting (1) from (2) allows us to arrive at the change in share prices due to restrictions on dividends:

$$P_0^{'} - P_0 = \underbrace{D_0 \frac{(ROE_1 - r^{'})}{1 + r^{'}}}_{\text{direct effect}} + \underbrace{\sum_{t=1}^{+\infty} D_t \left(\frac{1}{(1 + r^{'})^t} - \frac{1}{(1 + r)^t} \right)}_{\text{indirect effect}} \tag{3}$$

As is immediately visible from equation 3, the direct effect is stronger, *ceteris paribus*, when larger dividend amounts are postponed. Moreover, it will only be negative when the ROE of a bank is below its COE. As regards the indirect effect, its severeness increases with higher values for r'; it is also stronger for banks with an expected time profile of dividends tilted further into the future (duration effect).[10]

[10]The exercise here assumes that all other factors remain unchanged. In reality exogenous factors - such as changes in expected bank profitability or a widening of bank risk premia in line with general market developments (not related to the recommendation) could also have affected bank share prices.

3 Identification strategy and data

We examine the impact of the ECB recommendation on bank valuations using a difference-in-difference approach and listed NFCs as the control group. In essence the method compares changes in bank share prices after the announcement of the ECB recommendation to those observed for NFCs and attributes diverging trajectories to the policy. Listed NFCs are a natural control group in this setup: they were not subject to the dividend ban itself,[11] while their valuations still captured the evolution of relevant factors exogenous to the recommendation, like potential shifts in general risk aversion, the economic outlook or risk-free rates. Our baseline regression model is based on a symmetric two-week event window around the announcement of the recommendation. More specifically, we estimate a series of regressions with the following structure:

$$y_{i,t} = \gamma_i + \nu_t + \beta_1 * (\text{post recommendation}_t * \text{bank}_i) + \varepsilon_{i,t} \tag{4}$$

where $y_{i,t}$ denotes the daily cumulative stock return (since 15 March 2022) of firm i on date t. γ_i are a set of firm dummies which capture heterogeneity due to firm-specific, time invariant factors, ν_t a set of business day dummies which capture time-varying, aggregate factors, post recommendation$_t$ is a dummy variable taking value one after the ECB announcement (i.e. starting from 28 March) and zero otherwise, bank$_i$ is a dummy taking value one for all banks, and zero for all NFCs. The interaction between these two dummy variables thus constitutes our treatment indicator. Given the narrow event window we do not control for time-varying, firm-specific characteristics based on balance sheet and income statement because they vary at a considerably lower (typically quarterly) frequency. In addition, the firm fixed effects already control for any systematic differences across the two groups.

The main parameter of interest is β_1 of the interaction term between the bank and post recommendation dummies. It measures the average treatment effect of the ECB announcement on bank valuations. A significantly negative coefficient here would indicate a causal negative impact of the recommendation on bank market values.

The validity of our approach rests on the assumption that the cumulative stock returns of banks and NFCs would have evolved in parallel over the estimation period absent the announcement. A visual inspection of the underlying series prior to the announcement can provide

[11] Other financial intermediaries such as euro area insurance companies, like banks, were subject to distribution restrictions during 2020.

indicative evidence in this regard. In addition, we test whether the parallel trend assumption holds in our sample using a set of regressions with following structure:

$$y_{i,t} = \gamma_i + \nu_t + \sum_{t<t_0} \mu_t * \text{bank}_i + \sum_{t>t_0} \mu_t * \text{bank}_i + \varepsilon_{i,t} \tag{5}$$

where the reference date t_0 is the announcement date of the ECB recommendation, 27 March. Note that this is the final day of the *pretreatment* period as the ECB announcement had taken place on 27 March after markets had closed in Europe.

In this specification, the day-specific cofficient estimates μ_t of the interaction terms between the business day dummies in the pretreatment period ($t < t_0$) and the bank indicator variable test whether our dependent variable (cumulative stock returns) has evolved similarly across banks and NFCs prior to the announcement. A statistically insignificant estimate would confirm that bank and NFC share prices evolved in parallel over the pretreatment period and would confirm the validity of our empirical approach. By contrast, the estimates for μ_t in the post-treatment period ($t > t_0$) capture the average treatment effect of the dividend recommendation on bank share prices. Here, we would expect to find a negative impact that – if the efficient market hypothesis were to hold – should occur already on the first post-treatment day and persist over the treatment period. We also conduct two additional tests. First, we test for linear parallel trends by including a linear time trend for banks during the pretreatment period into equation 4 and test for the significance of the resulting coefficient (capturing differences in slopes between treatment and control groups in the pretreatment periods). And second, we perform a Granger-type causality test to check for anticipation effects. This test augments equation 4 with all possible leads of the treatment indicator and tests the joint significance of their respective coefficients using a Wald test.

We also double-check whether other important policy announcements, which may have affected the share prices of banks and NFCs to a different degree and thereby confound our findings, occurred within the time window of our analysis. A first set of announcements by the ECB in its function as a monetary and supervisory authority focused on banks yet occurred before our investigation period. Measures announced on 12 March 2020 notably included temporary operational and capital relief for euro area banks by the ECB's banking supervision function, as well as an easing of the conditions under which banks can access the TLTRO-III and additional long-term central bank credit operations aiming to support bank liquidity condi-

tions and money market activity by the monetary policy function. Other announcements, like the support for action by national authorities releasing macroprudential buffer requirements for euro area banks as well as a major recalibration of TLTRO-III and the introduction of pandemic emergency credit operations (PELTROs) occurred after our sample period (on 15 and 30 April, respectively).[12]

The notable exception is the pandemic emergency purchase programme (PEPP), which was announced on 18 March, 10 days before the announcement of the ECB recommendation. To make sure that this announcement does not bias our results we follow a three-pronged approach. First, we visually inspect the evolution of bank and NFC share prices (see for instance figure 2) to confirm that they co-move throughout the pretreatment period, including around the PEPP announcement and as mentioned already also test for the parallel trend assumption in the pretreatment period. Second, we confirm that any decoupling between banks and non-banks occurred strictly after the announcement of the dividend recommendation. And finally, we perform a robustness analysis with a shorter, two-week, time window, which starts after the PEPP announcement.

As regards the data, we obtain daily stock prices from Bloomberg and transform these into cumulative returns over a 4-week time window around the announcement date,[13] allowing us to focus on percentage changes in valuations over the investigation period. We use the same bank sample as Altavilla et al. (2021), from whom we obtain bank-level COE estimates, covering all listed euro area banks whose shares are frequently traded and sufficiently liquid.[14] Analyst expectations for banks' one-year ahead ROE are obtained from Bloomberg. Our control group consists of all NFCs included in the EURO STOXX 50 index. The final sample covers 40 banks as well as 40 NFCs. Information on whether banks had planned to pay dividends out of their 2019 profits is retrieved from banks' statements published prior to the recommendation and cross-checked using market data sources. Our data are summarized in tables A1 and A2 in the appendix.

[12] Similarly, important fiscal policy announcements followed our investigation period in the course of April, suhc as the announcement of the *Support to mitigate Unemployment Risks in an Emergency* a EU-level short-time work scheme as well as European Stability Mechanism credit lines and European Investment Bank backed guarantees for NFC loans.

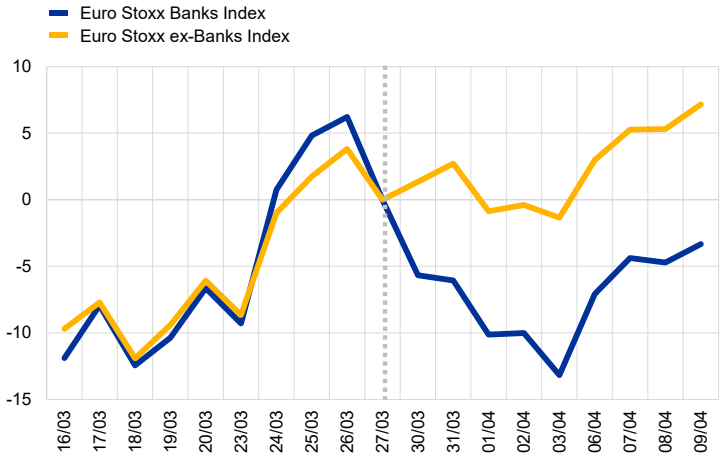
[13] 10 April was excluded as a public holiday.

[14] Altavilla et al. (2021) obtain bank-level COE estimates as model-averages across ten bank-level COE models, including five implied COE models and five factor models.

4 Results

Figure 2 shows the share price developments of euro area banks and NFCs over the four weeks around the announcement of dividend restrictions by the ECB. Euro area bank and NFC share prices co-moved tightly in the period up until 27 March. After the announcement bank shares declined significantly, while those of NFCs remained largely unchanged. The decoupling was notable and followed immediately after the announcement. This pattern is indicative of an overall negative impact of the ECB recommendation on bank valuations, which is in line with our first hypothesis.

Figure 2: Euro area bank and non-bank share price indices around the announcement of the ECB bank payout recommendation on 27 March 2020



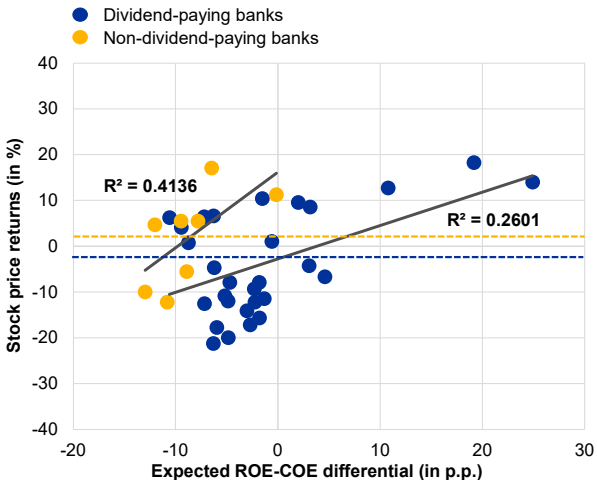
Note: This figure shows cumulative returns (in percent) of the EURO STOXX Banks index compared to the EURO STOXX ex-Banks index, normalised to zero at the date of announcement of the ECB recommendation (27 March 2020).

Figure 3) indicates that valuation losses were larger on average for banks which were expected to pay dividends and correlated negatively with the difference between the expected ROE for 2020 and bank-level COE estimates[15] indicating that the effect of the ECB restriction was stronger for banks which were expected to destroy shareholder value over the next year, in line with our third hypothesis.

Table 1 depicts results from a first formal impact evaluation in a difference-in-difference setup. We use the cumulative returns on shares over a 4-week window around the announcement as a dependent variable and NFCs as the control group. The specification in column (1) shows

[15]We take the end-February 2020 value for the gap between ROE and COE to minimize endogeneity. As argued, the announcement of dividend restrictions can affect bank COE thus giving rise to reverse causality if post announcement COE was to be considered.

Figure 3: Bank share price performance after the ECB announcement and bank's expected shareholder value generation capacity



Note: Dividend-paying banks refer to listed euro area banks which had announced to pay dividends during the time period covered by the recommendation by 27 March 2020, while non-dividend-paying banks refer to those banks which did not plan to pay dividends regardless of the ECB announcement. Natixis as an outlier is excluded from the chart. For ROE expectations and COE estimates we use end-February 2020 data from Bloomberg and Altavilla et al. (2021), respectively. The post-dividend recommendation stock price returns are calculated between 27 March 2020 and 03 April 2020. The yellow and blue dashed horizontal lines indicate the average post-dividend recommendation stock price returns for dividend-paying and non-dividend-paying banks, respectively.

results from the textbook setup with a bank and post recommendation dummy. We progressively add a full set of firm (in column (2)) and time fixed effects (in column (3)). The interaction term between the bank and post recommendation dummies captures the decline in valuations for banks compared to NFCs due to the announcement. We find that the March 2020 ECB dividend restrictions resulted in bank share prices falling on average by around 6.8%. The coefficient on the interaction term is significant at the 1% level and remarkably stable across all specifications.[16]

The validity of the difference-in-difference estimator hinges critically on the assumption that the share prices of banks and NFCs would have evolved by and large in parallel in the absence of the intervention as the the trajectory of NFC share prices can be used to back out the counterfactual for banks in a scenario without dividend restrictions only under this condition. The evolution of share price indexes for banks and NFCs before the dividend recommendation

[16]Table A3 in the appendix contains results using a shorter window of two weeks around the announcement date and indicates that banks share prices declined by around 6.7% on average during the week following the announcement.

Table 1: Overall impact of the March 2020 ECB payout recommendation on euro area bank share prices (NFCs control group)

	(1)	(2)	(3)
post recommendation * bank	-0.0678***	-0.0678***	-0.0678***
	(0.0150)	(0.0154)	(0.0155)
post recommendation	0.0768***	0.0768***	
	(0.0113)	(0.0116)	
bank	-0.0576**		
	(0.0221)		
Firm fixed effects	✗	✓	✓
Time fixed effects	✗	✗	✓
Observations	1520	1520	1520
R^2	0.132	0.684	0.797

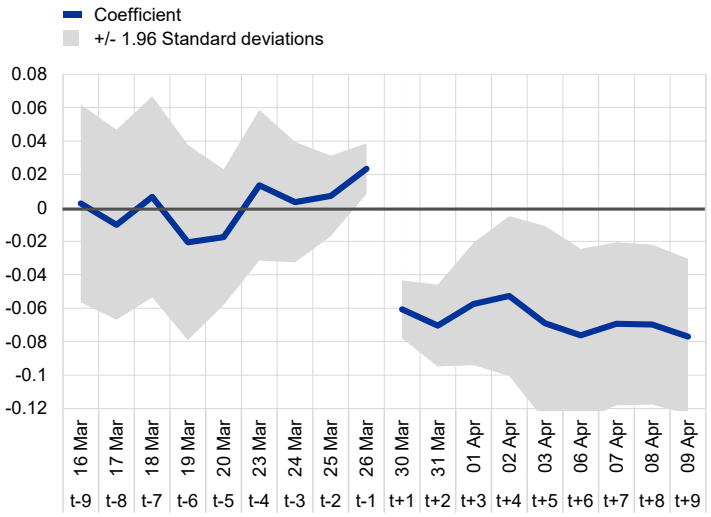
Note: Regression results in all columns are based on a sample of 40 banks and 40 NFCs. The dependent variable is the cumulated stock return over a symmetric 4-week window around the announcement of the March 2020 ECB recommendation. The interaction term between a bank and a post-recommendation dummy captures the decline in valuations for banks due to the announcement as compared to NFCs. Inference is based on cluster-robust standard errors with clustering at firm level. Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

was announced showed a very tight co-movement and provides strong indicative evidence that the parallel trends assumption holds (see figure 2). We also test for its validity in a regression setup. Figure 4 shows the coefficient estimates of the interaction terms between daily time dummies and the bank dummy. We find that all interaction terms prior to the announcement are insignificant[17] which confirms that bank and NFC shares have indeed co-moved tightly before the ECB announcement. Moreover, all estimates become significantly negative starting immediately after the announcement and are relatively stable over time.[18] We corroborate this finding using an additional test for linear parallel trends during the pre-treatment period and present the results in table 2. The test result shows that the null hypothesis of linear parallel trends before the ECB recommendation cannot be rejected. Furthermore, we perform a Granger-type causality test to investigate whether anticipation effects affect our result. This test augments equation 4 with all possible leads of the post recommendation*bank interaction term and tests the joint significance of their respective coefficients using a Wald test. The null hypothesis of no anticipation effect is strongly rejected, pointing to possible anticipation effects

[17] The only exception being 26 March, for which the estimate is positive and significant at the 5% level.

[18] In fact, abstracting from the level shift in share prices, banks and NFCs start to co-move tightly again after the announcement, also in line with the parallel trends assumption in the absence of these measures.

Figure 4: Validity of the parallel trends assumption for euro area bank share prices (NFCs control group)



Note: This figure shows estimates of the interaction terms between daily time dummies and a bank dummy around the announcement of the March 2020 ECB recommendation based on difference-in-difference regressions for banks and NFCs as well as their 95% confidence intervals.

ahead of the ECB recommendation (column (1). However, the anticipation effect appears to occur on the day of the announcement of the ECB recommendation as the Wald statistic loses significance once the last pretreatment date is shifted from 27 March to 26 or 25 March (columns (2) and (3)).[19] Overall, our estimates can be considered conservative in case of any anticipation effects as possible anticipation of the recommendation would have limited its impact after 27 March. Taken together, these results confirm the validity of the difference-in-difference estimator and thus a negative causal effect of the dividend recommendation on bank share prices which - in line with the efficient market hypothesis - was priced-in immediately after the announcement.

We also investigate whether the ECB recommendation had heterogeneous impacts across euro area countries: First, we use the Oxford Coronavirus Government Response Tracker (Ox-CGRT) project's lockdown stringency index to and include this into equation (6). Corresponding results are shown in table A8 in the appendix. This sensitivity analysis confirms that the ECB recommendation had a significantly negative causal effect on bank share prices, while the estimated effect increases in magnitude once lockdown stringency is controlled for. We also check whether the impact of the ECB recommendation has been the same for banks from all euro

[19]The ECB recommendation was announced officially on 27 March after markets had closed in Europe and we therefore use this date for the further analysis presented in this paper.

Table 2: Overall impact of the March 2020 ECB payout recommendation on euro area bank share prices (NFCs control group) - impact of anticipation effects

	(1)	(2)	(3)
last pre-treatment date	27 Mar	26 Mar	25 Mar
post recommendation * bank	-0.0678***	-0.0612***	-0.0508***
	(0.0155)	(0.0146)	(0.0150)
Firm fixed effects	✓	✓	✓
Time fixed effects	✓	✓	✓
Observations	1520	1520	1520
Test for linear parallel trends (*p-value*)	0.5625	0.4667	0.6248
Granger causality test (*p-value*)	0.0036***	0.0659*	0.1366

Note: The test for linear parallel trends is based on augmenting the regression model with a linear time trend for banks during the pre-treatment period and performing a Wald test of the resulting coefficient under a zero null hypothesis while the Granger causality test augments the regression model by leading treatment indicators and performs a joint Wald test on the resulting coefficients under a zero null hypothesis. Inference is based on cluster-robust standard errors with clustering at firm level. Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

area countries by including country-specific treatment dummies into our regressions. The corresponding results are shown in table A9 in the appendix. The estimated coefficients show that the impact on banks was the same across all countries with the exception of Greece, where it was significantly smaller.

In the next step, we empirically evaluate whether both channels – the delay in distributions and the potential increase in bank risk premia – were important in explaining the observed decline in bank share prices. For this purpose, we rely on two complementary regression setups. First, we focus exclusively on the direct effect, which should apply only to banks that would have paid out in the absence of a dividend restriction. As a control group, we use the set of banks which were not expected to pay dividends. The results are included in table 3, columns (1) to (3), while column (4) focuses on cross-sectional differences in the strength of the direct effect depending on banks' ability to generate shareholder value. Subsequently, we focus on the indirect effect. The treatment group in this case comprises only banks that were not expected to pay dividends over the duration of the dividend restriction since this set of institutions would be affected at most only indirectly. The control group in this case are NFCs, which were not affected either directly nor indirectly.

We identify institutions which were expected to make distributions based on banks' publicly announced dividend proposals and their payout calendar (we label them 'dividend payers' and the respective indicator variable dividend payer dummy). More specifically, the dividend payer

dummy will take the value one for all banks that had made a clear proposal for a dividend payment falling within the time horizon covered by the recommendation (i.e. between 27 March and end-September 2020) before the date of the announcement on 27 March. The dummy will take value zero for all other banks, notably including those which had not planned to pay any dividends out of their 2019 and 2020 profits and those who had already fully paid out their announced dividends by 27 March and thus were not directly affected.[20]

Table 3: Impact of the March 2020 ECB payout recommendation on euro area bank share prices depending on distribution plans and income generation capacity (non-dividend-paying banks control group)

	(1)	(2)	(3)	(4)
post recommendation * dividend payer	-0.0897***	-0.0897***	-0.0897***	-0.0554*
	(0.0175)	(0.0179)	(0.0181)	(0.0322)
post recommendation	0.0762***	0.0762***		
	(0.0150)	(0.0154)		
dividend payer	-0.0801**			
	(0.0386)			
post recommendation * dividend payer * destroys shareholder value				-0.0508*
				(0.0288)
Firm fixed effects	✗	✓	✓	✓
Time fixed effects	✗	✗	✓	✓
Observations	760	760	760	703
R^2	0.135	0.686	0.793	0.773

Note: The dependent variable is the cumulated stock return over a symmetric 4-week window around the announcement of the first ECB recommendation. The dividend payer dummy takes value 1 if a bank had announced to pay dividends while the destroys shareholder value dummy takes value 1 if a bank had an expected ROE below COE at end-February 2020. Inference is based on cluster-robust standard errors with clustering at firm level. Standard errors are shown in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

The results in table 3 show that the negative impact of the recommendation was stronger for banks that were expected to pay dividends out of their 2019 profits: the share prices of this set of institutions declined by around 9 percentage points relative to their non-dividend-paying peers

[20]The dividend payer dummy also takes value one for four Spanish banks (Bankia, BBVA, Caixabank and Sabadell), who paid dividends regardless of the ECB recommendation as their annual shareholder meetings had already taken place and agreed on dividend payments ahead of the recommendation, but we also present regression results leaving out these four banks for robustness in table A4. Furthermore, (anticipated) cancellation of share buybacks due to the ECB recommendation could also give rise to a direct effect, just as for cancelled dividends payments. We found that some euro area banks had indeed announced buybacks plans for 2020 and some publicly revoked them as the ECB recommendation was issued. However, all banks that had announced buybacks were also expected to pay dividends (and cancelled their dividend plans with the ECB restriction), and thus the dividend payer dummy can be understood as also covering share buybacks.

during the two weeks following the ECB announcement. Furthermore, the direct effect (i.e. from the delay in payouts) was more pronounced for banks that were expected to destroy shareholder value (i.e. with an expected ROE below COE) in line with our theoretical considerations (see column (4)). The result implies that a dividend-paying bank with an expected ROE below its COE would have suffered a valuation loss of about 10.5% compared to the reference group of non-dividend-paying banks. Note that in our sample all banks that did not plan to pay out dividends were also expected to destroyed shareholder value. By contrast, dividend payers with an expected ROE above their COE, suffered a notably smaller valuation loss compared to the reference group of only 5.5%.[21] Table A5 in the appendix displays results from the same regressions based on a short window of two weeks around the announcement date.

As before, we confirm the validity of the parallel trends assumption and inspect the exact timing at which the direct and indirect effect affected bank valuations. Figure 5 decomposes the significant and persistent overall decline in bank share prices compared to NFCs presented earlier in two components: on the left-hand side, we focus on the relevance of the indirect effect, comparing non-dividend paying banks to NFCs, while the right-hand side depicts the additional impact for dividend-paying banks compared to banks that had not planned any distributions to shareholders over the life of the dividend restrictions.

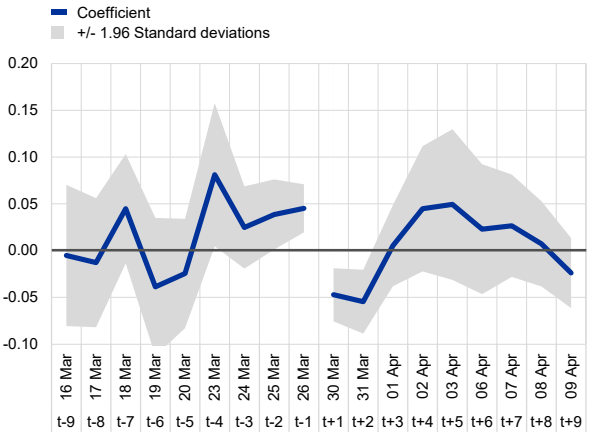
Overall, the results indicate that the immediate reaction in bank equity markets affected the sector as a whole through elevated uncertainty widening banks' equity risk premia. During the first two business days after the announcement, the evolution of share prices of directly affected banks does not differ from the one of institutions which would not have payed out dividends anyway. Moreover, the latter group's valuations notably declined compared to NFCs since increases in bank equity risk premia depress the net present value of all future payouts, including those occurring after the expected end of the dividend restriction.

The decoupling of dividend-paying from non-paying banks appears to have happened only subsequently, visible in negative and highly significant interaction terms only from 1 April onward. Notably, we see the indirect effect dissipating as financial markets are able to identify and process bank-specific exposure to the dividend ban and discriminate banks according to their

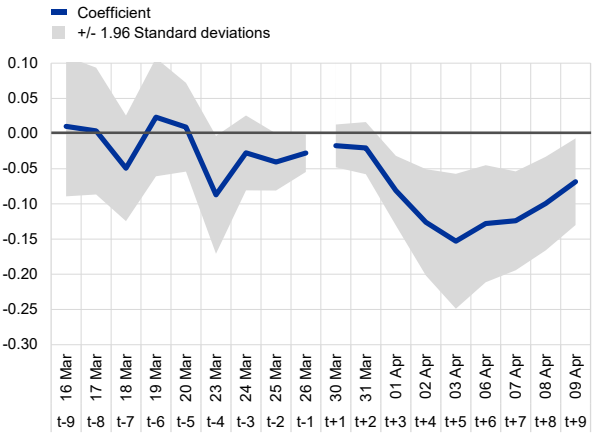
[21] Table A5 in the appendix uses the same regression setup with a shorter time window of two weeks around the announcement date and shows a similar average decline in share prices of dividend-paying banks relative to their non-dividend paying peers during the week following the ECB announcement, but insignificant coefficient for the destroys shareholder value dummy.

Figure 5: Timing of the impact of the ECB recommendation depending on payout plans

(a) non-dividend paying banks and NFCs control group



(b) dividend-paying banks and non-dividend-paying banks control group



Note: Both panels show estimates of the interaction terms between daily time dummies and a dummy for non-dividend paying banks (left) and dividend-paying banks (right) around the announcement of the March 2020 ECB recommendation based on difference-in-difference regressions as well as their 95% confidence intervals.

actual payout plans.[22] The delay of a few days after the announcement could be also partly be explained by the fact that most banks actively communicated that they would follow the recommendation only during the course of the week following the announcement.

Overall, our results confirm the relevance of both channels in explaining the evolution of bank share prices. Furthermore, they imply that the initial impact of the recommendation on bank share prices was through an increased bank risk premium (i.e. the indirect effect), while the mechanical impact of postponed cash-flows (the direct effect) became relevant only with a slight delay, as market participants were processing bank-specific announcements and assessing to which extent dividend payments would actually be affected.

[22] In line with this pattern, we find no evidence of a persistent negative indirect effect over the full two week time period, see table A6.

5 Quantifying the effects of dividend restrictions with a sector-level dividend discount model

This section contains complementary, model-based, sector-level analysis, which decomposes the overall decline in bank share prices observed after the ECB announcement into a contribution from the dividend recommendation – quantifying the importance of the direct and indirect effect - and a residual, driven by other factors such as expected bank profitability.

To this end we use a three-stage dividend discount model. This class of dividend discount models assumes that dividends grow at a short-term growth rate g^S during an initial, before converging to a long-term growth rate g^L during a transition phase. Subsequently dividends are then assumed to grow steadily at a long-term growth rate g^L (see Molodovsky et al., 1965; Scott Bauman, 1969; Fuller, 1979). In line with Fuller and Hsia (1984), we assume that dividend growth adapts linearly from g^S to g^L. The model is given as follows:

$$P_0 = \frac{D_1}{(1+r)^1} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \frac{D_3 * (1+g^L) + D_3 * H * (g^S - g^L)}{\frac{r-g^L}{(1+r)^3}} \tag{6}$$

where D_1, D_2 and D_3 denote the expected dividend payments in $t = 1, 2, 3$ (the initial phase). The duration of the initial phase is set to three periods due to data availability as dividend expectations from analysts are typically available three years into the future. The duration of the transition phase is set at $H = 5$, which is standard in the literature. r is the current discount rate, which equals the sum of the equity risk premium and the risk-free rate. The model is solved numerically for r using data on dividend expectations (D_1, D_2, D_3), expectations for g^S and g^L and the current price P_0.

To fit the model we use Refinitiv I/B/E/S data for the EURO STOXX Banks index. The EURO STOXX Banks index covers all banks included in the broad EURO STOXX index and had 25 constituents as of March 2020. Refinitiv I/B/E/S provides several relevant data items at the index-level, including actual index-weighed dividends and earnings per share, as well as dividend and earnings expectations up to three years ahead. We collect data on 2019 dividends (to be paid out in calendar year 2020) as well as expected dividends for 2020 and 2021 (for distribution mostly in calendar year 2021 and 2022, respectively).

We use the I/B/E/S 3-5 years ahead average dividend growth rate for the initial dividend growth rate g^S and long-term GDP growth expectations as reported by Consensus Economics

for the long-term growth rate g^L. Finally, we use the one-year overnight index swap rate as the risk-free rate. The model is implemented at a weekly frequency, which corresponds to the highest frequency at which earnings and dividend estimates are available.

The model implementation requires additional assumptions about the approximate timing of the dividend payments to investors at the index-level. To inform this decision, we compute the average dividend payment date at the index-level by weighting each bank's announced payment date with the planned dividend amount. We find that on average, the payment of D_1 (referring to dividends out of 2019 bank profits) would have occurred in calendar week 16 of 2020.[23] The ECB dividend recommendation was issued 3 weeks earlier, in calendar week 13. Still, a small number of banks had already paid out dividends by the date of the ECB announcement, related to their payout calendars. We collect data on actual and planned dividend payments for each bank in the EURO STOXX Banks index from their respective annual financial statements and market data sources and find that around 13% of aggregate 2019 dividends had already been paid out according to banks payout calendars prior to the ECB recommendation. We therefore reduce D_1 accordingly.

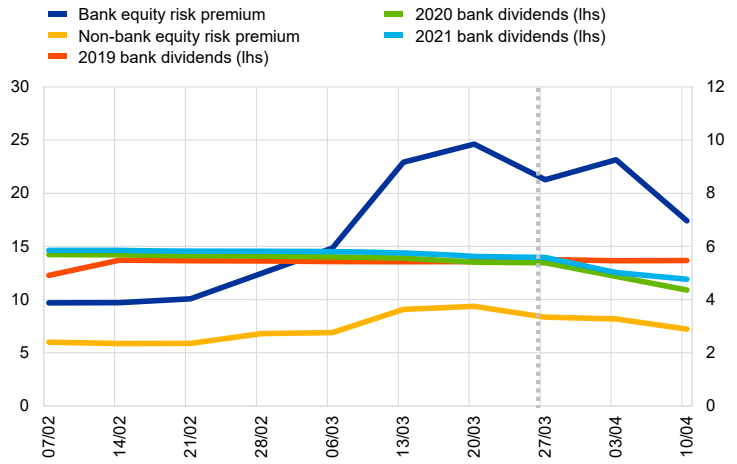
In the following we decompose the decline in bank stock prices observed following the ECB announcement in factors related to the ECB dividend recommendation (the delay in distributions and any associated increase in bank equity risk premia) and a residual, unrelated to the dividend recommendation (e.g. due to changes in expected bank profitability or risk free rates).

Figure 6 displays movements in dividend expectations (used as inputs in the model) and the estimated equity risk premium for euro area banks as well as non-banks (for which we fit the dividend disocunt model to the EURO STOXX ex-Banks index). Three main observations emerge. First, bank risk premia increased notably in the week after the announcement of the dividend restriction. Second, the estimated equity risk premium for non-banks in fact declined slightly during the same period which is unusual given that these two risk premia typically show a strong positive correlation. Third, expectations about 2020 and 2021 bank dividends continued to follow a downward trend following the week of the recommendation (this decline was driven by expectations of weaker earnings rather than a lower share of earnings being paid out). This drift in expected bank profits likely reflects the anticipation of an immanent recession due to the pandemic which depressed bank valuations but is not causally related to the dividend

[23] The same timing is applied to subsequent calendar years and all discount factors in equation 6 are adjusted accordingly.

recommendation. By contrast, the increase in the bank-specific equity risk premium is indicative of the indirect effect of the dividend restriction for euro area banks.

Figure 6: Bank dividend expectations and estimated equity risk premia around the announcement of the ECB payout recommendation



Note: This figure shows the estimated bank equity risk premium and non-bank equity risk premium (both in % p.a.) derived from a three-stage DDM for the EURO STOXX Banks and EURO STOXX ex-Banks indices. Bank dividends are weighted average dividends per share (in EUR), weighted according to each banks' index weight in the EURO STOXX Banks index (forecasts for 2020 and 2021 are weighted means across analyst forecasts, all weighted averages can be obtained directly from I/B/E/S).

The quantitative importance of the direct and indirect effect of the dividend recommendation on bank valuations is estimated in a series of comparative static exercises: First, we obtain the impact of delayed investor cash flows implied by the recommendations by assuming that expected dividend payments in 2020 would be paid out with a one-year delay (i.e. in 2021) in a nutshell varying their timing while holding the overall amount of dividends, the bank equity risk premium and risk-free rate constant. The resulting decline in bank shares can then be attributed to the direct effect. In a similar vein, given the strong co-movement between the equity risk premium for banks and for non-banks, we attribute the increase in equity risk premium observed for banks relative to non-banks to an increase in perceived uncertainty of future dividends related to the ECB announcement. We argue that the increase in bank equity risk premia is caused by the ECB recommendation and is not simply a result of a general increase in investor risk aversion. Figure 6 shows that the estimated non-bank equity risk premium had declined slightly during the week following the announcement, indicating overall slightly improved investor sentiment. Further evidence is presented in table A10 in the appendix which contains results of a regression

of a long time series of the bank equity risk premium on the non-bank equity risk premium. The resulting estimate is 1.36 and is highly significant, while the respective linear correlation coefficient between the two series is 0.63. The regression of risk premia predicts a reduction in the bank equity risk premium for the week following the ECB recommendation, in line with a reduction in the estimated non-bank equity risk premium for this week.[24] This finding provides further evidence that the increase in bank equity risk premium, and the resulting effect on bank share prices, was caused by the ECB announcement and was not simply a result of a general widening of equity risk premia in the euro area. Thus we attribute the decline in bank shares due to the widening of bank equity risk premia, other model inputs held constant at their pre-announcement levels, to the indirect effect. Impacts of other factors such as changes in risk-free rates and expected bank profitability are being quantified in a similar manner. The individual contributions typically interact: e.g. the direct effect of postponed cash flows will be smaller for lower discount rates.

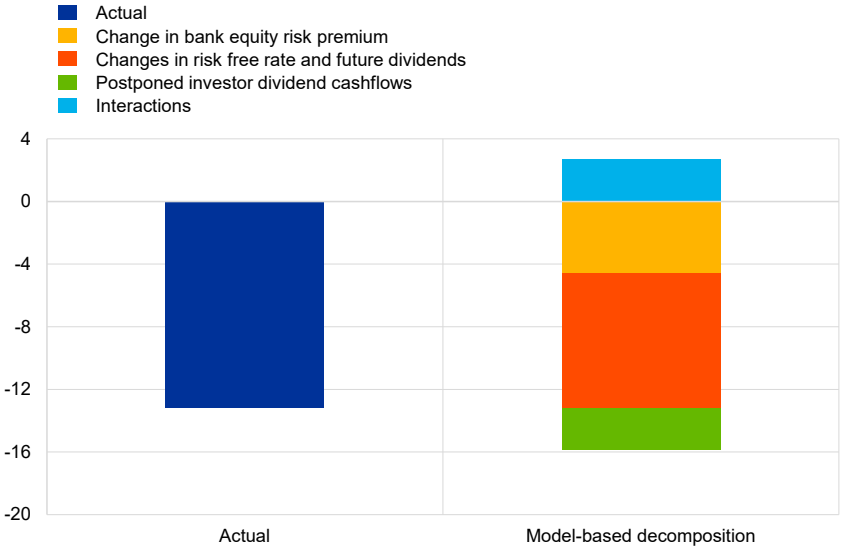
Figure 7 displays the resulting decomposition. Two important observations emerge. First, out of the overall 13% observed decline in bank share prices, only roughly half can be attributed to the dividend restriction. The rest is driven by exogenous factors, importantly the continued decline in expectations about future bank earnings as it became increasingly likely that the euro area economy was about to enter a deep recession. The overall effect of around 7% which the model-based decomposition traces back to the ECB announcement is comparable to the average effect obtained from in the difference-in-difference analysis in section 4.

Second, both channels seem quantitatively important in explaining the impact of the dividend restriction on bank share prices during the first week after the announcement. This conclusion is also broadly in line with our difference-in-difference results. More precisely, the model-based decomposition indicates that the mechanical delay of investor cash flows explains 3 percentage points of the decline, while perceptions of elevated uncertainty of future dividends feeding into higher bank equity risk premia explain almost 5 percentage points of the decline in the EURO STOXX Banks index.

At first sight the stronger importance of the indirect effect compared to the direct effect is not fully in line with the indications based on the results in section 4, which point to a immediate yet temporary indirect effect while the direct channel, which relies on investors being able

[24] Furthermore, we find that the residual from this regression in the week following the announcement is positive and outside the 90% confidence interval. This implies that bank equity risk premia had indeed experienced a significant shock relative to what historical regularities would have implied.

Figure 7: Decomposition of banking sector returns following the announcement of the March 2020 ECB payout recommendation based on a three-stage dividend discount model



Note: This figure shows a decomposition of the change in bank share prices during the week following the announcement of the ECB recommendation. The left bar displays the decline in the EURO STOXX Banks index during the week following the ECB announcement. The right bar shows a decomposition of the decline in prices by means of a three-stage dividend discount model (see eq. 6), varying model inputs one at a time.

to discriminate across banks depending on distribution plans and income generation capacity, appears to kick in with a delay but be more durable and stronger. The discrepancy likely reflects to some degree technicalities, like differences in the sample of 25 banks included in the EURO STOXX Banks index used in the model-based decomposition versus the wider sample of 40 institutions used for the difference-in-difference analyses, as well as the fact that the former weights banks according to their market capitalisation while the latter attaches the same weight to all firms in the sample. In addition, one needs to also consider that the comparative-statics approach used above may underestimate the true impact of the direct effect, since it is measured holding the bank cost of equity constant at its pre-announcement level, while in reality we observed a parallel increase in banks' cost of equity, which amplifies its strength.

6 Conclusions

This paper focuses on the impact of dividend restrictions on bank market values – a side effect of supervisory recommendations introduced the euro area in the context of the COVID-19 crisis, aiming to boost bank lending capacity and resilience. We focus on the March 2020 ECB recommendation and its impact on euro area banks. The paper documents a causal, negative effect on bank share prices of around 7% on average over a symmetric two weeks window around the announcement. The impact is found to be stronger for banks who were expected to pay dividends during the period of the recommendation and weaker for banks which generate shareholder value. We argue that a negative impact arises through two channels: first, directly, through a delay in investor cash flows and second, indirectly, through increasing the equity risk premium of affected banks.

Our analysis can help to understand the unintended consequences of such policies and improve their overall efficiency. It is important to clarify that the available empirical evidence convincingly confirms the effectiveness of the ECB recommendation in achieving its stated objective of conserving bank capital and lending capacity. In this context, and despite a negative impact on bank share prices, we see the delay in investor cash flows as necessary for the effectiveness of the measure: bank capital can only be conserved if profits are temporarily retained in the banking system, available to absorb losses and support lending. In that sense, the decline in bank share prices via the direct channel is necessary for the effectiveness of the measure, rendering it akin to a transmission channel of these measures rather than a clear side effect.

By contrast, we clearly consider valuation losses arising through increased bank equity risk premia as harmful. An increase in banks' cost of equity is not necessary for the effectiveness of the dividend restrictions. Quite on the contrary, should it become entrenched, it can even be detrimental to the objective of the measure as attracting new equity capital would become more challenging and expensive. Moreover, increases in bank costs of equity can feed into higher borrowing costs for households and non-financial firms and result in welfare losses.[25]

Against this background, our analysis suggests that the overall efficiency of dividend restrictions can be improved substantially by proactively managing market expectations about the duration, frequency and severity of regulatory interventions in payout decisions. For exam-

[25]To note, our analysis provides no evidence of an entrenched increase in bank cost of equity as it focuses on the short-term effects (the difference-in-difference regressions cover a narrow two-week event window around the announcement, while the dividend discount model-based decomposition covers an even shorter period of one week following the announcement of the ECB recommendation).

ple, clear, consistent and credible communication, laying out the timeline and conditions under which normal payout policies would be resumed can effectively counteract surges in uncertainty and the associated declines in bank valuations, without any negative bearing on the amount of retained bank capital. The communication of the December 2020 extension, which clarified that the recommendation would be repealed in September 2021 in the absence of materially adverse developments, effectively included elements of forward guidance aiming to address such concerns.

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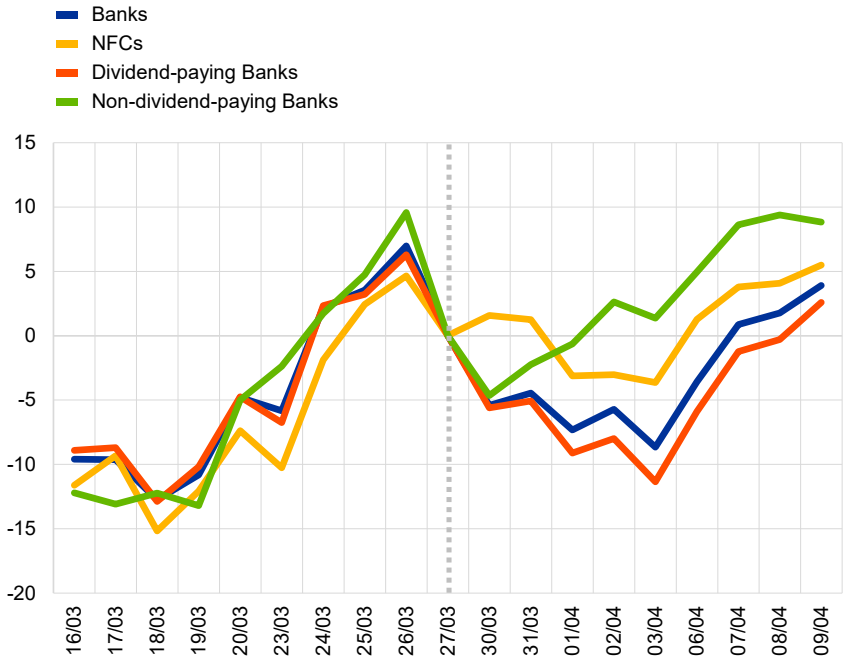
A Appendix

Figure A.1: Share prices of banks and NFCs around the announcement of the ECB payout recommendation



Note: This figure shows cumulative returns (in percent) for 40 banks compared to 40 NFCs, dividend-paying banks and non-dividend-paying banks, normalised to zero at the date of announcement of the ECB recommendation (27 March 2020). Cumulative returns are calculated as a simple averages for each group of firms.

Table A1: Descriptive statistics

	Obs	Mean	Std. Dev.	Min	Max
Cumulative returns					
Banks	760	-0.0409	0.1542	-0.4689	1.0934
Dividend-paying banks	570	-0.0715	0.1482	-0.4689	1.0934
Non-dividend-paying banks	190	0.0511	0.1342	-0.2287	0.36
NFCs	760	0.0489	0.1188	-0.3695	0.4235
Pre-recommendation Cumulative returns					
Banks	400	-0.0451	0.1552	-0.4689	1.0934
Dividend-paying banks	300	-0.0651	0.1564	-0.4689	1.0934
Non-dividend-paying banks	100	0.015	0.1354	-0.2287	0.352
NFCs	400	0.0125	0.1066	-0.3695	0.3047
Post-recommendation Cumulative returns					
Banks	360	-0.0361	0.1531	-0.3817	0.6942
Dividend-paying banks	270	-0.0786	0.1384	-0.3817	0.6942
Non-dividend-paying banks	90	0.0912	0.1214	-0.1905	0.36
NFCs	360	0.0893	0.1188	-0.3334	0.4235

Notes: This table contains descriptive statistics of cumulative stock returns (dependent variable in difference-in-difference regressions) for the sample period ranging from 16 March to 09 April 2020 (upper panel), for the period leading up to the ECB recommendation until including 27 March (middle panel) and the the post-recommendation period from 30 March to 09 April (lower panel).

Table A2: Descriptive statistics

Firms	Destroys shareholder value	Generates shareholder value	Total
Banks	33	7	40
Dividend-paying banks	23	7	30
Non-dividend-paying banks	10	0	10
NFCs	-	-	40

Notes: This table shows the number of dividend-paying and non-dividend-paying banks that destroy or generate shareholder value.

Table A3: Overall impact of the March 2020 ECB recommendation on euro area bank share prices (NFCs control group) based on a shorter (two weeks) event window

	(1)	(2)	(3)
post recommendation * bank	-0.0671***	-0.0671***	-0.0671***
	(0.0138)	(0.0144)	(0.0145)
post recommendation	0.0154	0.0154	
	(0.00984)	(0.0103)	
bank	-0.0535*		
	(0.0282)		
Firm fixed effects	✗	✓	✓
Time fixed effects	✗	✗	✓
Observations	880	880	880
R^2	0.097	0.795	0.861

Note: Regression results in all columns are based on a sample of 40 banks and 40 NFCs. The dependent variable is the cumulated stock return over a symmetric 2-week window around the announcement of the first ECB recommendation. The interaction term between a bank and a post-recommendation dummy captures the decline in valuations for banks due to the announcement as compared to NFCs. Inference is based on cluster-robust standard errors with clustering at firm level. Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A4: Impact of the March 2020 ECB recommendation on euro area bank share prices depending on distribution plans and income generation capacity (non-dividend-paying banks control group) - excluding four Spanish banks that paid dividends despite the recommendation

	(1)	(2)
post recommendation * dividend payer	-0.0892***	-0.0554*
	(0.0190)	(0.0323)
post recommendation * dividend payer * destroys shareholder value		-0.0527*
		(0.0292)
Firm fixed effects	✓	✓
Time fixed effects	✓	✓
Observations	684	627
R^2	0.7997	0.78

Note: The dependent variable is the cumulated stock return over a symmetric 4-week window around the announcement of the first ECB recommendation. Dividend payer and destroys shareholder value are dummies taking value 1 if a bank had announced paying dividends or had an expected 2021/2021 ROE below estimated COE at end-February 2020. Bankia, Banco de Sabadell, BBVA and Caxiabank are excluded from the sample. Inference is based on cluster-robust standard errors with clustering at firm level. Standard errors are shown in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A5: Impact of the March 2020 ECB recommendation on euro area bank share prices depending on distribution plans and income generation capacity (non-dividend-paying banks control group) based on a shorter (two weeks) event window

	(1)	(2)	(3)	(4)
post recommendation * dividend payer	-0.0555***	-0.0555***	-0.0555***	-0.0451
	(0.0167)	(0.0175)	(0.0177)	(0.0318)
post recommendation	-0.0100	-0.0100		
	(0.0125)	(0.0130)		
dividend payer	-0.0980**			
	(0.0477)			
post recommendation * dividend payer * destroys shareholder value				-0.0254
				(0.0304)
Firm fixed effects	✗	✓	✓	✓
Time fixed effects	✗	✗	✓	✓
Observations	440	440	440	407
R^2	0.128	0.815	0.872	0.862

Note: The dependent variable is the cumulated stock return over a symmetric 2 week window around the announcement of the first ECB recommendation. Dividend payer and destroys shareholder value are dummies taking value 1 if a bank had announced paying dividends or had an expected 2020 ROE below estimated COE at end-February 2020. Inference is based on cluster-robust standard errors with clustering at firm level. Standard errors are shown in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A6: Impact of the March 2020 ECB recommendation on share prices of non-dividend-paying banks (NFCs control group)

	(1)	(2)	(3)
post recommendation * bank	-0.000573	-0.000573	-0.000573
	(0.0187)	(0.0192)	(0.0194)
post recommendation	0.0768***	0.0768***	
	(0.0113)	(0.0116)	
bank	0.00241		
	(0.0339)		
Firm fixed effects	✗	✓	✓
Time fixed effects	✗	✗	✓
Observations	950	950	950
R^2	0.099	0.619	0.781

Note: Regression results in all columns are based on a sample of 10 non-dividend-paying banks and 40 NFCs. The dependent variable is the cumulated stock return over a symmetric 4-week window around the announcement of the first ECB recommendation. The interaction term between a bank and a post-recommendation dummy captures the decline in valuations for non dividend-paying banks due to the announcement as compared to NFCs. Inference is based on cluster-robust standard errors with clustering at firm level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A7: Impact of the March 2020 ECB recommendation on share prices of non-dividend-paying banks (NFCs control group) based on a short event window

	(1)	(2)	(3)
post recommendation * bank	-0.0255	-0.0255	-0.0255
	(0.0159)	(0.0166)	(0.0168)
post recommendation	0.0154	0.0154	
	(0.00989)	(0.0104)	
bank	0.0200		
	(0.0386)		
Firm fixed effects	✗	✓	✓
Time fixed effects	✗	✗	✓
Observations	550	550	550
R^2	0.005	0.710	0.804

Note: Regression results in all columns are based on a sample of 10 non-dividend-paying banks and 40 NFCs. The dependent variable is the cumulated stock return over a symmetric 2 week window around the announcement of the March 2020 ECB recommendation. The interaction term between a bank and a post-recommendation dummy captures the decline in valuations for non dividend-paying banks due to the announcement as compared to NFCs. Inference is based on cluster-robust standard errors with clustering at firm level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A8: Overall impact of the March 2020 ECB payout recommendation on euro area bank share prices (NFCs control group) controlling for lockdown stringency

	(1)	(2)	(3)
post recommendation * Bank	-0.0678***	-0.1166***	-0.1539***
	(0.0155)	(0.0173)	(0.0407)
post recommendation *			
more affected countries (stringency)		0.0175	
		(0.0232)	
post recommendation * Bank *			
more affected countries (stringency)		0.0535*	
		(0.0271)	
post recommendation * stringency			0.0008
			(0.0011)
post recommendation * Bank *			
stringency			0.0016
			(0.0011)
Firm fixed effects	✓	✓	✓
Time fixed effects	✓	✓	✓
Observations	1520	1463	1463
R^2	0.797	0.802	0.804

Note: The dependent variable is the cumulated stock return over a symmetric 4-week window around the announcement of the March 2020 ECB recommendation. The interaction term between a bank dummy and a post-recommendation dummy captures the decline in valuations for banks due to the announcement as compared to NFCs. Column (1) is as in table 1, in column (2) we include a dummy splitting countries into two groups (above and below median) according to their lockdown stringency index (taken from the Oxford Coronavirus Government Response Tracker (OxCGRT) project) on 27 March 2020, while column (3) includes the stringency index directly into the interaction terms. Inference is based on cluster-robust standard errors with clustering at firm level. Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A9: Country-dependent impacts of the recommendation

	(1)
post recommendation * bank	-0.0982***
	(0.0364)
post recommendation * country * bank	
BE	0.0300
	(0.0384)
DE	0.00430
	(0.0416)
ES	0.0547
	(0.0407)
FR	-0.0100
	(0.0427)
GR	0.137***
	(0.0314)
IE	-0.0940
	(0.0578)
IT	-0.0105
	(0.0846)
NL	0.00214
	(0.0165)
Post recommendation * country fixed effects	✓
Firm fixed effects	✓
Time fixed effects	✓
Observations	1520
R^2	0.815

Note: Regression results in all columns are based on a sample of 40 banks and 40 NFCs. The dependent variable is the cumulated stock return over a symmetric 4-week window around the announcement of the March 2020 ECB recommendation. AT is excluded for identification purposes and thus serves as the reference country. Furthermore, there are no listed banks from FI in our sample. Inference is based on cluster-robust standard errors with clustering at firm level. Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A10: Regression of changes in bank equity risk premia on changes in non-bank equity risk premia

	(1)
Change in non-bank ERP	1.357***
	(0.135)
Constant	0.00339
	(0.00372)
Observations	817
R^2	0.402

Note: This table shows results of a regression of a long series (since 2004) of the estimated EURO STOXX Banks equity risk premium on the estimated EURO STOXX ex-Banks equity risk premium. Both equity risk premia were estimated wiht a three-stage dividend discount model. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

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