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CURSE AND BLESSING: THE EFFECT OF THE DIVIDEND BAN ON EURO AREA BANK VALUATIONS AND SYNDICATED LENDING

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Curse and blessing: the effect of the dividend ban on euro area bank valuations and syndicated lending

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Abstract

At the outbreak of the Covid-19 pandemic, the European Central Bank issued a strong recommendation towards banks to halt dividend payouts. The goal of this de facto dividend ban was to boost banks' capital to ensure the supply of new credit. However, given the importance of dividends for stock market investors, this unprecedented measure is likely to have impacted bank valuations. Hence, banks may have chosen to preserve their higher capital buffers to boost payouts after the lifting of the ban, rendering the intended positive effect on credit supply a priori uncertain. We first investigate the effect of the dividend ban announcement on euro area banks' valuations and find a significantly negative impact. Second, we assess the effect of the dividend ban on syndicated lending, including potential heterogeneity depending on the stock market reaction. We show that credit supply significantly increased, without counteracting effect of the negative stock market reaction.

Keywords: Covid-19; dividend, euro area banks; market valuation; syndicated lending

JEL: E51, G21, G28

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1. Introduction

Early in the Covid-19 pandemic, the European Central Bank (ECB) issued a recommendation to euro area banks not to distribute dividends to shareholders and not to execute share buybacks, to ensure that the banks remained well capitalized and to increase bank lending to the real economy. While the measure was framed as a recommendation, it was swiftly followed by similar calls from the European Banking Authority (EBA), the European Systemic Risk Board (ESRB) and many national supervisory authorities. Indeed, following the recommendation, most banks immediately announced that they would refrain from dividend payments and share buybacks. Hence, in the remainder of the paper, we will refer to the ECB recommendation as the 'dividend ban'. This unprecedented supervisory action can be interpreted as a countercyclical measure aimed at avoiding the widely anticipated Covid recession. Since bank lending is the major source of corporate funding in the euro area, it is important to assess the effectiveness of this ECB policy action.

We investigate whether the dividend ban achieved its stated objective of supporting bank lending, with a focus on corporate syndicated loans. In a period of extreme uncertainty, banks face a complex set of trade-offs in deciding whether or not to use the additional capital to extend more loans. The dividend ban increases retained earnings and the resulting higher capital buffers can be used to support additional lending, as intended by the supervisor. Yet, banks are reluctant to see their dividends curtailed because it may hamper their valuation and hence their overall funding costs. In the case of the dividend ban, a negative reassessment of bank valuations could incentivize banks not to extend more loans. In addition, banks may want to signal that the dividend ban should be regarded by investors as temporary and that they intend to resume dividend payout as soon as they can. Hence they may refrain from using the additional capital buffer to support more lending, especially when a bank is close to its minimum capital requirements. The ultimate outcome is an empirical matter which we investigate for euro area banks affected by the dividend ban.

On March 27 2020, the ECB recommended that euro area banks do not pay dividends or buy back shares until at least October 2020, hence without a pre-determined end date.[4] The policy

[4] As largely expected, the dividend ban was extended in July 2020 and (partially) in December 2020. The lifting

measure affected dividends to be paid from profits earned in 2019 and 2020 and was introduced at the group level of significant institutions under the supervision of the Single Supervisory Mechanism (SSM). The measure was issued in an environment of high uncertainty and the anticipation of a recession. The dividend ban aimed to prevent banks from distributing the capital released by the Covid-related capital relief measures announced by the ECB on March 12 and, in general, support the resilience of the banks, conserve their capital buffers and augment their ability to provide additional funding to the real economy. The ECB dividend ban is an appropriate laboratory to study the implications of payout restrictions on bank valuations and their subsequent lending behavior. The ECB was among the first supervisors to impose dividend restrictions, which reduces potential anticipation of this measure by market participants and provides a quasi-natural experiment design. Moreover, the ECB payout restrictions covered both dividends and share repurchases, which was not the case for the initial announcements in other jurisdictions (Hardy, 2021). Finally, European banks conduct more dividend smoothing compared to US banks (Koussis & Makrominas, 2019), which makes them particularly sensitive to dividend payout restrictions.

We start by estimating the impact of the dividend ban on euro area banks' stock market valuations. If banks suffer severe valuation losses, it may incentivize them not to use the additional capital buffer to support lending, but conserve it in order to pay dividends as soon as the ban is lifted. Therefore, we conduct an event study around the announcement of the dividend restrictions. We indeed find that banks which were expected to pay a dividend in 2020 experience negative stock market abnormal returns of -5% to -7% on average upon announcement of the ban, confirming similar evidence in other papers. A difference-in-differences estimation with banks as the treated group and non-bank financial institutions as the control group yields a similar result: euro area banks suffer a decline in stock market valuation caused by the announcement of the dividend ban. However, the decline seems to be temporary and has largely disappeared by the end of May 2020.

Second, we contribute to the literature by analyzing the impact of the dividend ban on the credit supply of affected euro area banks in the syndicated loan market. We focus on syndicated loans

of the restrictions (from the end of September 2021 onwards) was announced in July 2021.

because this is new lending, often to large capital-intensive firms, which is important to support investment in the economy in the face of an anticipated Covid-induced recession. We design a difference-in-differences setup, in which we use banks that were expected to pay a dividend in 2020 as the treated group, while banks that were not expected to pay a dividend serve as the control group. We find that the dividend ban causes affected euro area banks to increase new syndicated loan amounts by a substantial 20% to 30% in the subsequent quarters. While this effect is a micro (loan-level) estimate, we also examine the macroeconomic effect, in the spirit of Amiti & Weinstein (2018) and Tielens & Van Hove (2017), and find that the aggregate credit supply in the euro area syndicated loan market increased by 7% to 10% in the 9 months following the dividend ban announcement, which corresponds to an additional 13bn to 16bn USD of syndicated lending. We find no evidence of a negative effect of the drop in market valuations, nor of heterogeneous effects depending on banks' capital adequacy or risk profile. Our results are robust to a variety of alternative specifications and matching approaches, as well as extensions in which we include European banks headquartered in countries outside the euro area.

In summary, we find that the ECB dividend ban provided banks with additional capital buffers, which they effectively used to support lending, in line with the ECB's stated objective. We find no counteracting effect of the negative stock market reaction on credit supply, suggesting that the intensity of the valuation effect following the announcement of the ban did not affect the banks' subsequent syndicated loan supply. We can therefore conclude that the unprecedented dividend restrictions imposed by the ECB have supported bank syndicated lending in the heat of the Covid-19 pandemic.

The remainder of the paper is organized as follows. In section 2, we elaborate on our contribution to the literature. In section 3, we discuss the data, followed by the methodology in section 4. The results are presented in section 5. We provide ample robustness in section 6 and conclude in section 7.

2. Literature and hypotheses

Our paper is firmly situated in the literature examining the dividend behaviour of banks. In general, it is found that banks aim to maintain a stable payout policy, especially in the euro area (Koussis & Makrominas, 2019; Muñoz, 2021). This is because dividends are used as a signal of financial strength towards shareholders and customers (Abreu & Gulamhussen, 2013; Forti & Schiozer, 2015; Belloni et al., 2022). This mechanism is found to be particularly important during periods of crisis, for example the Global Financial Crisis (Acharya et al., 2022). When banks do decide to cut their dividend payouts, this is associated with a negative impact on their market valuations (Bessler & Nohel, 1996). Next to dividend cuts made by individual banks, research shows that a sector-wide ban on dividends is also detrimental for banks' market valuations. Regarding the ECB dividend ban in March 2020, Andreeva et al. (2023) find that euro area banks experienced a significant negative impact of 7% compared to non-financial corporations (NFCs). This negative impact can be attributed to a delay in cash flow streams to shareholders, and indirectly to higher perceived risk (increase in the bank equity risk premium). Using an event study analysis similar to the methodology used in this paper, Pablos & Pérez Montes (2022) also find a negative valuation impact for euro area banks following the dividend ban announcement, with size and a low CET1 ratio as determinants for a larger negative impact. In contrast to the euro area, in the United States no general dividend ban was imposed. However, the Fed curtailed the payout capacity of the larger banks based on a stress test. Kroen (2022) finds that this measure was associated with a decline in equity prices for the affected banks. In our paper, we conduct an extensive analysis of the valuation impact of the dividend ban on a sample of 62 euro area banks, using both an event study and a difference-in-differences methodology.

Our paper further contributes to the literature in assessing the impact of macroprudential policy to counter procyclical bank behaviour. In general, previous research finds that macroprudential policy succeeds in smoothing credit cycles (Cerutti et al., 2017; Jiménez et al., 2017)). We focus specifically on capital-based macroprudential policy measures. On March 12 2020, the ECB announced a capital relief package, allowing banks to temporarily operate below the level of capital defined by the capital conservation buffer (CCoB) and the Pillar 2 Guidance (P2G), as well as to partially use additional Tier1 or Tier2 capital to meet Pillar 2 Requirements (P2R), which was explicitly targeted at supporting the real economy. According to the literature, a decrease in capital requirements should lead to an increase in lending (Gambacorta & Shin, 2018; Imbierowicz et al., 2018). For example, reducing countercyclical capital buffers during the Covid-19 period, and hence strengthening banks' capital buffer, is found to have significantly boosted lending (Dursun-de Neef et al., 2023). Matyunina & Ongena (2022) estimate that the total capital relief for euro area banks accumulated to 1.7 percentage points and led to a growth in lending of between 2% and 2.6% over the following year. Couaillier (2021) highlights that the effect is mostly due to measures that have a longer or permanent duration and which are associated with the capacity of banks to pay dividends. Following the initial capital relief package, the ECB announced a recommendation prohibiting banks to pay dividends to their shareholders on March 27. This measure aimed at ensuring that the capital relief measures were used to augment bank capital, which should translate into an increase in the supply of lending. Dautovic et al. (2023) estimate that the dividend ban increased outstanding credit growth by 2.1 percentage points.[5] This positive effect on credit supply is confirmed by Ampudia et al. (2023), who also study the general equilibrium effects of the dividend ban in a theoretical DSGE model. Likewise, Martínez-Miera & Vegas (2021) find that Spanish banks that restricted dividends in 2020 significantly increased lending to firms. In contrast to Dautovic et al. (2023) and Martínez-Miera & Vegas (2021), who use supervisory credit register data (Anacredit and the Banco de España's Central Credit Register respectively), we focus specifically on the syndicated loan market, using publicly available data.

Crucially, the effectiveness of the dividend ban depends of the willingness of banks to use the extra capital to increase lending. Matyunina & Ongena (2022) argue that market pressure could incentivize banks not to increase lending. This is because they might want to underline the temporary nature of the dividend ban to their shareholders, meaning dividends are only delayed, not foregone. These arguments are also highlighted by Güntay et al. (2022), who show that if policymakers only limit payouts for a subgroup of vulnerable banks, it creates additional incentives

[5]In section 6.3, we explain how our results on the impact of the dividend ban on the growth of new (syndicated) lending can be compared to an impact on the growth of outstanding credit.

for the remaining banks to issue dividends to show their financial strength. We are the first to investigate this potential channel empirically, using the dividend ban as a quasi-natural experiment.

Based on the literature, we formulate the following hypotheses:

H1: The dividend ban announcement has a negative impact on euro area banks' stock market valuations.

Given the importance of dividends as a signal for the financial soundness of a bank, and the practice to maintain stable dividend patterns even during crisis periods, we expect the dividend ban to have a negative impact on the market valuations of banks in the euro area. This would be in line with the findings of empirical studies on the dividend ban (Pablos & Pérez Montes, 2022; Andreeva et al., 2023). This analysis allows to confirm the existing literature and to obtain an estimate of the stock market reaction of individual banks following the dividend ban announcement, which we subsequently use in the analysis on the impact of the dividend ban on banks' lending behaviour.

H2: The dividend ban has a positive effect on syndicated lending.

As a result of the dividend ban, banks' capital base increases because dividends are retained. In the literature, there is evidence of the positive relationship between bank capital and the supply of lending (Gambacorta & Shin, 2018; Dursun-de Neef et al., 2023). Hence, we expect the dividend ban to have a positive effect on syndicated lending.

H2.1: The positive effect on syndicated lending is lower if the bank's stock market valuation was hit harder by the dividend ban announcement.

The effectiveness of the dividend ban depends on the extent to which banks transmit their higher capital ratios towards lending. Because of the importance of dividends for bank shareholders, we expect that banks whose stock market valuations were hit harder by the dividend ban announcement will be cautious in increasing lending, in order to be able to compensate their shareholders when the ban is lifted. This would be in line with the arguments made by Matyunina & Ongena (2022).

H2.2: The positive effect on syndicated lending is heterogeneous across bank characteristics.

Further, we expect that banks with a lower (excess) capital ratio will increase their lending with a lower intensity compared to banks with a higher (excess) capital ratio, in line with Gambacorta &

Mistrulli (2004). We analyze the absolute level of the capital ratio and the distance to the regulatory minimum buffer. We further incorporate banks' size and their risk profile into our analysis.

3. Data

Our baseline analyses are conducted on a sample of 62 listed euro area banks. We only include listed banks, which allows to measure the stock market impact of the dividend ban announcement. Our main focus is on banks headquartered in the euro area, because these banks were all subject to the ECB's recommendation regarding dividend distributions on March 27 2020.

For the analysis on the stock market impact and its determinants, we use data from several sources. First, we obtain stock market data from Refinitiv. We download total return indices and only include bank stocks which are sufficiently liquid in the period before the dividend ban announcement.[6] In our baseline Capital Asset Pricing Model (CAPM), we use the MSCI Europe as market index and the EONIA as risk-free rate.[7] Second, for each of the banks in the sample, we obtain expected dividend per share data from Refinitiv. To ensure that Covid-related issues are not yet impacting the dividend estimates, we use end-2019 dividend estimates which are related to the dividends to be distributed out of the profit for fiscal year 2019 (which is announced during the first months of 2020).[8] Third, we include end-2019 bank balance sheet and income statement variables from S&P Capital IQ Pro. Summary stats are shown in the first panel of Table 1.

For the syndicated loan analysis, we obtain loan data from LPC Dealscan. We manually match the lenders in Dealscan to the euro area banks in our sample, assigning all loans (tranches) given by majority-owned subsidiaries to their parent bank and accounting for mergers and acquisitions. We include loans originated between July 1 2019 and December 31 2020, i.e. a symmetric period around the dividend ban announcement at the end of March 2020. We focus on originations only (disregarding amendments) and we do not include loans originated from January 2021 onwards,

[6] Based on the number of days with zero trading volume, as well as the magnitude of the estimated market betas.

[7] Robustness checks show that the results are similar with a more extended Fama and French 3-factor model, as well as with country-specific market indices and risk-free (government bond) rates.

[8] Our results are similar when we use the announced dividends for banks which had already disclosed their dividend before the dividend ban announcement, and use expected dividends for banks which had not yet done so.

since they may be affected by the partial relaxation of the dividend ban in December 2020. A key feature of the syndicated loan market is that these loans are usually split between different banks in the syndicate. Regarding these banks, a distinction can be made between lead banks and participants. The lead bank initiates the syndication process, leads the negotiations and conducts due diligence on the borrower. Subsequently, the loan amount is divided among the participating banks. The lead bank normally retains an important share in the loan and obtains an additional fee for its role in the syndication process. After the loan origination, the lead is also responsible for monitoring the borrower. Following most of the existing literature, we therefore focus on lead banks in the core of the paper, using a lead bank definition based on Ivashina (2009) and Degryse et al. (2023a).[9] We focus on loans to NFCs, by omitting loans to borrowers with SIC code between 6000 and 6999 as in Ferreira & Matos (2012), and we remove loan tranches for which no loan amounts are available. Finally, in line with Gropp et al. (2019), we focus on the two most common loan types (term loans and credit lines), which represent approximately 75% of the observations.[10]

Additionally, we include several bank and firm control variables in the specifications (cf. section 4.2), to account for other factors which are potentially driving credit supply and demand. Quarterly bank control variables are obtained from S&P Capital IQ Pro. In the syndicated loan sample, 44 of the 62 listed euro area banks are participating in at least one loan tranche, of which 40 banks are acting as leads. To obtain borrowing firm data, we first match listed borrowers in the syndicated loan sample to Refinitiv using their PermID. Subsequently, non-listed European borrowers are matched to Orbis Europe (Bureau van Dijk) using a combination of the Legal Entity Identifier, country of headquarters and website address.[11] Summary stats for the syndicated loan data, as well as the bank and firm controls are shown in the second panel of Table 1.

[9] If a loan tranche has an admin agent, we assign this bank as lead bank in the tranche. If there is no admin agent, we assign banks as lead if they have a 100% share, if they are the only lender in the tranche or if they have one of the following roles: agent, (mandated or lead or coordinating) arranger, bookrunner, lead bank, lead manager, lead left or sole lender. Our results are qualitatively similar when including both lead banks and participants, cf. section 6.2.

[10] We remove term loans of type B (and further), because they are typically sold to institutional investors within days of origination (Blickle et al., 2022).

[11] In the 6 quarters in our analysis, the 44 banks in the sample lend to 2348 unique firms (of which 1406 in Europe). Of these 2348 firms, 1422 can be matched to Refinitiv or Orbis (1219 in Europe). A limitation of our dataset is that we cannot match non-listed non-European firms.

Table 1: Descriptive statistics of key variables

Variable	Obs	Mean	SD	Min	Max
Stock market analysis					
Bank stock return	9486	-0.27	2.97	-23.90	25.68
Market return	153	-0.16	1.53	-11.56	3.20
Risk-free rate	153	-0.44	0.03	-0.47	-0.36
ExpDivYield	62	4.46	3.40	0.00	18.49
ExpPOR	62	44.16	66.75	0.00	524.59
Syndicated loans analysis					
Total loan amount (m USD)	3308	312.93	827.49	0.13	16543.50
Number of leads	3308	3.04	2.23	1.00	16.00
Bank equity/assets	240	7.76	3.97	3.64	43.80
Bank CET1/RWA	240	15.00	4.29	10.53	48.27
Bank MDA distance	192	4.22	1.70	1.88	7.82
Bank size	240	18.88	1.59	14.04	21.71
Bank loans/assets	228	59.72	15.54	14.49	86.71
Bank deposits/assets	228	67.48	16.08	18.78	88.08
Bank cash/assets	240	12.82	6.02	3.36	36.92
Bank NPL/loans	228	5.34	7.66	0.70	45.37
Firm size	2132	8.91	4.79	3.33	17.58
Firm debt/assets	2127	54.08	27.42	3.96	95.62
Firm ROA	2099	2.99	5.11	-7.14	14.03

This table shows the number of observations, mean, standard deviation, minimum and maximum for the loan, bank and firm variables. The first panel shows summary statistics for the key variables in the stock market analysis, while the second panel shows summary statistics for the key variables in the syndicated loans analysis (lead banks only). Firm data are winsorized at the 5^{th} and 95^{th} percentile.

4. Methodology

4.1. Stock market analysis

In the first part of our analysis, we examine the effect of the dividend ban announcement on the stock returns of euro area banks. For each bank, we obtain daily abnormal returns (AR) by comparing the realized return of these banks over a short event window around the announcement with forecasted returns, estimated using the CAPM (MacKinlay, 1997). In the robustness section, we use the Fama and French 3-factor model, adding a high-minus-low (HML) and small-minus-big (SMB) factor to the market risk factor, as proposed by Fama & French (1992). Eq.(1) shows how these ARs are derived for the baseline analysis:

$$AR_{b,t} = R_{b,t} - (\hat{\alpha}_b + \hat{\beta}_b \cdot R^m_{b,t}) \tag{1}$$

The ARs are calculated by subtracting the forecasted returns from the realized returns. As a market index, we use the MSCI Europe. Alphas and betas are obtained over an estimation period consisting of 150 (trading) days, up to 5 days before the estimation window. In our baseline model, we opt for a 3-day event window around March 30 2020, the first trading day after the recommendation was made public.[12] Next, after obtaining an AR for each bank and for each day of the event window, we calculate the cumulative abnormal return (CAR) as the sum of the ARs over the event window for each bank, the average abnormal return (AAR) as the average of the ARs across banks for each day in the event window, and the cumulative average abnormal return (CAAR) as the sum of the AARs over the event window. We test whether the CAAR is different from zero using several significance tests. In line with Ricci (2015), we use two parametric tests. The first test statistic for the CAAR, as described by Boehmer et al. (1991), is constructed as in eq.(2). In this equation, $SCAR$ is calculated as the CAR divided by its forecast-error-corrected standard deviation, and $\overline{SCAR}$ and S_{SCAR} correspond to the average and the standard deviation of the $SCAR$, respectively. This test statistic addresses the issue of increased volatility that may be associated with the event.

$$t_{BMP} = \sqrt{N} \cdot \frac{\overline{SCAR}}{S_{SCAR}} \tag{2}$$

The second parametric test is an adjustment of the Boehmer et al. (1991) test, as proposed by Kolari & Pynnönen (2010). This test statistic controls for cross-sectional correlation induced by clustering of event dates. We estimate eq.(3), in which $\overline{r}$ corresponds to the average sample cross-correlation of the ARs over the estimation window.

$$t_{K\&P} = t_{BMP} \cdot \sqrt{\frac{1 - \overline{r}}{1 + (N-1)\overline{r}}} \tag{3}$$

Additionally, we also add two non-parametric tests, which have the advantage of not making assumptions on the distribution of the data. The test statistic of the Corrado Rank Z test, as in Corrado & Zivney (1992) is given by eq.(4). For this test statistic, we obtain L as the number

[12] The dividend recommendation was announced on (Friday) March 27 after trading hours.

of days in the event window. For each day in the estimation and event window, $\overline{K}_t$ denotes the average of the (scaled) ranks of the individual banks' ARs. $\overline{K}_{EvW}$ corresponds to the average of $\overline{K}_t$ over the event window. Finally, $S_{\overline{K}}$ represents the standard deviation of $\overline{K}_t$ over all estimation and event window days.

$$z_{Rank} = \sqrt{L} \cdot \frac{\overline{K}_{EvW} - 0,5}{S_{\overline{K}}} \qquad with \quad \overline{K}_{EvW} = \frac{1}{L} \cdot \sum_{EvW} \overline{K}_t \tag{4}$$

We further report results using the Generalized Sign Z test, based on Cowan (1992), which is calculated in eq.(5). In this equation, w is equal to the number of positive CARs in the event window and p is equal to the proportion of positive ARs during the estimation window.

$$z_{GenSign} = \frac{w - N \cdot p}{\sqrt{N \cdot p \cdot (1 - p)}} \tag{5}$$

In the event study, the impact of the dividend ban on market valuations is estimated by comparing the stock price evolution of each bank with the counterfactual path stock prices would have followed in absence of the dividend ban (estimated using the CAPM). This approach allows to obtain a bank-specific estimate of the impact of the dividend ban on the stock market value (the CAR). An alternative approach consists in comparing the stock price evolution of a group of affected (treated) banks with a group of non-affected (control) banks, by exploiting the dividend ban as a quasi-natural experiment in a difference-in-differences specification. More specifically, we compare the stock market performance of banks which were (before the dividend ban announcement) expected to pay out a dividend to their shareholders with the stock market performance of banks without expected dividend, as shown in eq.(6).

$$CumulR_{b,t} = \beta_1 \cdot D_b^{ExpDiv} \cdot Post_t + \alpha_b + \eta_t + \epsilon_{b,t} \tag{6}$$

As dependent variable, we use bank-specific (daily) cumulative returns. In the baseline analysis, we consider a period starting one week before and ending one week after the dividend ban announcement. The treatment indicator is the interaction between the $Post_t$ dummy (which is 1 from March 30 onwards) and a dummy which indicates whether the bank was expected to pay out a dividend in 2020. A negative β_1 would confirm that the dividend ban negatively affects banks with a pre-ban expected dividend in terms of market valuation. The standard errors are clustered at the bank level and we control for unobserved heterogeneity using bank and time fixed effects. Subsequently, we estimate an extension of eq.(6) in which we use banks as the treated group and non-bank financial corporations as the control group, in line with Kovner & Van Tassel (2022).[13] This approach allows us to directly check the validity of hypothesis H1, which conjectures that the dividend ban announcement had a negative impact on euro area banks. We further employ multiple variations of eq.(6), including different sample compositions and extended time frames, to investigate whether or not the impact of the dividend ban was long-lived.

4.2. Syndicated loans analysis

In the second part of this paper, we investigate the impact of the ECB dividend ban on the supply of credit in the syndicated loan market. We estimate the following difference-in-differences specification:

$$ln(amount)_{l,b,f,t} = \beta_1 \cdot D_b^{ExpDiv} \cdot Post_t + \beta_2 \cdot X_{b,t-1} + \beta_3 \cdot Z_{f,t-1} + \alpha_b + \eta_{i,c,s,t} + \nu_l + \epsilon_{l,b,f,t} \quad (7)$$

In eq.(7), the dependent variable is the natural logarithm of the loan amount corresponding to loan l, given by lead bank b to borrowing firm f at time t.[14] If multiple leads are involved in the same loan, the loan is included multiple times (once for each lead), as in Ferreira & Matos (2012). To avoid overrepresentation of loans with multiple leads, we estimate eq.(7) with weighted least squares (WLS), with the weights inversely proportional to the number of leads, in line with Botsch & Vanasco (2019).[15] The main explanatory variable is the interaction between a dummy

[13] We select the 50 largest listed euro area non-bank financial corporations based on total assets. The sample includes corporations active in the following industries (S&P Capital IQ Pro classification): Multiline, Life and Health, Reinsurance, Insurance Broker, Asset Management, Investment Banks, Brokers and Capital Markets, Financial Guaranty, Specialty Finance (Consumer and Commercial Focused), and Property and Casualty.

[14] Following Ferreira & Matos (2012) and Beck & Keil (2022), a loan refers to a tranche (or facility) in Dealscan.

[15] In section 6.2, we show that our results are robust to various alternative approaches.

which indicates whether or not the bank was expected to pay a dividend before the announcement of the dividend ban (D_b^{ExpDiv}) and a dummy which is 1 for all loans originated after the dividend ban announcement ($Post_t$).[16] In line with hypothesis H2, we expect a positive β_1, indicating a beneficial effect of the dividend ban on euro area banks' credit supply. Alternatively, we replace this dummy variable by the (pre-dividend ban) expected dividend yield or the expected dividend payout ratio.

Additionally, we control for other (lagged) bank characteristics by including vector $X_{b,t-1}$, capturing banks' size, as well as their ratio of equity, loans, deposits and cash (all as percentage of total assets). We use bank fixed effects (α_b) to control for time-invariant heterogeneity between banks, as well as, in our baseline specification, industry-country-quarter fixed effects ($\eta_{i,c,t}$) to account for differences in credit demand. This approach is in line with Gropp et al. (2019) and Degryse et al. (2023b) and assumes that firms located in the same country and active in the same industry (defined at SIC-2 level) have a similar credit demand in a certain quarter. Moreover, even though the syndicated loan market is dominated by large firms which are less targeted by Covid-related government support measures (Falagiarda et al., 2020), the inclusion of industry-country-quarter fixed effects also controls for potential heterogeneity in these Covid-related measures in different countries and towards different industries. It also allows to control for more general monetary and fiscal policy changes during the sample period, as well as the potential direct effects of the Covid-19 pandemic on banks' lending to firms in highly-affected industries and countries (Hasan et al., 2021). According to Degryse et al. (2019), this approach is preferred over the use of firm-quarter fixed effects (with which one only identifies effects based on firms borrowing from multiple banks in the same quarter, in the spirit of Khwaja & Mian (2008)) when most firms borrow from only one bank in every time period, which is the case for the vast majority of firms in our sample. Finally, we control for different loan characteristics (ν_l), using fixed effects for loan currency, loan purpose and loan type. Standard errors are clustered at the bank level, to account for heteroskedasticity between banks and correlation within banks over time.

[16] For the sake of simplicity (in combination with the quarterly time fixed effects), $Post_t$ is 1 for all loans originated from April 1 2020 onwards.

In more extensive specifications, we add different lagged firm-level controls $Z_{f,t-1}$ (size, debt-to-assets ratio and profitability) and more granular industry-country-size-quarter fixed effects ($\eta_{i,c,s,t}$) to capture firms' credit demand. We do not include these firm controls or industry-country-size-quarter fixed effects in the baseline specification, because it implies that we have to match the borrowing firms to Refinitiv and Orbis, which causes the number of observations to drop significantly. Moreover it may cause the sample to be tilted towards listed and/or European firms, because non-listed non-European firms cannot be matched, as explained in section 3.

Subsequently, we investigate whether or not the effect of the dividend ban on banks' credit supply is counteracted by the extent to which banks' stock market value has been hit by the dividend ban announcement, as described in hypothesis H2.1. More specifically, we add an interaction between CAR_b (cf. section 4.1) and $Post_t$ to the baseline specification, as is shown in eq.(8). To facilitate the interpretation, we define the CAR variable in these regressions with an opposite sign, i.e. a higher CAR means that the bank's stock market valuation has been hit harder by the dividend ban announcement. In these specifications, β_1 captures to what extent a bank with a pre-ban expected dividend increases its credit supply, assuming its market valuation was not hit by the dividend announcement. β_2 indicates the additional effect on credit supply (negative if hypothesis H2.1 holds) of a bank whose stock market valuation is affected by the dividend ban announcement.

$$\begin{aligned} ln(amount)_{l,b,f,t} = \beta_1 \cdot D_b^{ExpDiv} \cdot Post_t + \beta_2 \cdot CAR_b \cdot Post_t \\ + \beta_3 \cdot X_{b,t-1} + \beta_4 \cdot Z_{f,t-1} + \alpha_b + \eta_{i,c,s,t} + \nu_l + \epsilon_{l,b,f,t} \end{aligned} \quad (8)$$

Finally, we also investigate potential heterogeneity in the effect of the dividend ban on credit supply, depending on bank characteristics. More specifically, we examine whether the effect is larger depending on the bank's capital ratio, size, non-performing loans ratio or distance to the Maximum Distributable Amount (MDA) threshold (cf. hypothesis H2.2).[17] Therefore, we add triple

[17] When banks' capital ratios are below the MDA threshold, distributions to shareholders are restricted. We proxy the distance to the MDA threshold by subtracting the sum of Pillar 1 requirements (P1R), the capital conservation buffer (CCoB), the countercyclical buffer (CCyB), the buffer for systemically-important institutions (G-SIB or O-SII) and Pillar 2 requirements (P2R) from the CET1 ratio. Note that P2R are not publicly known for all banks in our

interactions between $Post_t$, D_b^{ExpDiv} and Int_b (time-invariant, end-2019 interaction variables), as shown in eq.(9). The interaction variables are demeaned using the mean of the treated banks, in order to facilitate the interpretation of the β_1 coefficient on the double interaction, as suggested by Wooldridge (2021). Hence, this coefficient captures the effect of the dividend ban for a bank with an average value for the bank characteristic used in the triple interaction.

$$ln(amount)_{l,b,f,t} = \beta_1 \cdot D_b^{ExpDiv} \cdot Post_t + \beta_2 \cdot Int_b \cdot Post_t + \beta_3 \cdot D_b^{ExpDiv} \cdot Int_b \cdot Post_t + \beta_4 \cdot X_{b,t-1} + \beta_5 \cdot Z_{f,t-1} + \alpha_b + \eta_{i,c,s,t} + \nu_l + \epsilon_{l,b,f,t} \quad (9)$$

5. Results

5.1. Stock market analysis

In this subsection, we analyse the valuation impact of the ECB dividend ban announcement on euro area banks. We first conduct an event study and subsequently confirm the main results using a difference-in-differences analysis.

Based on hypothesis H1, we expect a negative impact of the dividend ban on euro area banks' stock returns. The results support this hypothesis. The baseline event study estimation, conducted with a CAPM model utilizing a 3-day event window (March 27, March 30, and March 31) and a 150-day estimation window, reveals a CAAR of -5.14% for the full sample of banks over the 3-day event window, as shown in Table 2.[18] On the event date (March 30), the AAR is significantly different from zero based on all test statistics, at the 1% or 5% significance level. Over the full event window, the CAAR is significantly different from zero (at least at the 10% significance level) based on 3 of the 4 test statistics. Only with the Kolari & Pynnönen (2010) test statistic the CAAR is borderline insignificant at the 10% level. Additional sample splits show that the valuation impact is only significant for banks which were expected to pay a dividend over 2020. Over the 3-day event

sample, hence this extension somewhat decreases the number of observations. We do not account for the systemic risk buffer (SyRB) since this buffer requirement is not always applied to banks' full RWA and hence it would require more detailed information on banks' asset composition.

[18]Results are qualitatively similar when using the full year 2019 as estimation window.

window, the CAAR for these banks amounts to -6.63% (significant using all test statistics), while the CAAR for banks without expected dividend is 0.47%. This is intuitively logical since banks without expected dividend were in practice not affected by the ban. We exploit this difference in more detail in the difference-in-differences specification in the next paragraph. The findings of our analysis indicate that, in terms of market valuations, the dividend ban has clearly impacted the euro area banking sector adversely in the short term, which is in line with previous research (e.g. Pablos & Pérez Montes (2022) and Andreeva et al. (2023)).

Table 2: Abnormal returns and statistical measures

Day	**March 27**	**March 30**	**March 31**	**Full window**
(C)AAR	0.17	-4.46	-0.85	-5.14
Test statistics				
BMP	0.34	-8.36***	-2.45**	-5.86***
Adj BMP (K&P)	0.09	-2.18**	-0.64	-1.53
Rank Z	0.00	-2.59***	-0.69	-1.89*
Gen Sign Z	-0.23	-5.57***	-1.76*	-4.30***

The first panel of this table shows the average abnormal return on March 27, March 30 and March 31, as well as the cumulative average abnormal return over the full 3-day event window. We use a 1-factor CAPM model and a 150-day estimation window. In the second panel, we show the corresponding test statistics (null hypothesis: (C)AAR = 0), based on Boehmer et al. (1991), Kolari & Pynnönen (2010), Corrado & Zivney (1992), and Cowan (1992). They are denoted by BMP, Adj BMP (K&P), Rank Z and Gen Sign Z respectively. *, ** and *** indicate significance at 10%, 5% and 1% respectively.

Our event study results are confirmed by the difference-in-differences specification in Table 3. First, in column (1), the sample consists only of banks and we focus on a two-week period around the dividend ban announcement. We compare the returns of banks which were expected to pay a dividend in 2020 with the non-dividend payers and control for unobserved heterogeneity using bank and time (day) fixed effects. The coefficient on the interaction of interest is significant at the 1% significance level and indicates a negative valuation impact of -5.64% for the dividend-paying banks. However, we do not find a significant coefficient when including the level of the expected dividend yield in column (2). This is also the case for the expected payout ratio in column (3). Hence, it is the extensive margin of dividends which explains post-ban returns, not the intensive margin. In column (4) of Table 3, we use a sample of non-bank financial corporations as a control group. The treatment group consists of all listed euro area banks. This specification yields a coefficient which is negative and significant, showing that the dividend ban caused banks' valuations to decrease by 4.77%.[19] In the specification in column (4), the sample of banks and non-bank financial corporations consists of entities with and without expected dividends. However, as indicated in column (1), the impact of the dividend ban on corporations with and without expected dividend might be different. Hence, in column (5), we repeat the banks versus non-banks analysis considering only (non-)banks with expected dividend for 2020. The results are qualitatively similar. Finally, the difference-in-differences methodology allows to consider a longer time frame in order to investigate the medium- to long-term impact of the dividend ban on market valuations. In the final three columns of Table 3, we extend the time frame of the analysis, again comparing banks with and without expected dividend. In column (6), when analyzing the impact for an extended time period of two weeks following the dividend ban announcement, the coefficient on the treatment indicator is negative and significant and is qualitatively similar to the results in column (1), which only considers the impact up to one week following the announcement. Also when extending the time period to the end of April 2020 in column (7), the negative valuation impact persists. Column (8), however, shows that the valuation impact becomes transitory when considering a longer time period (until the end of May).

In conclusion, the results in this subsection point to a pronounced negative valuation impact on dividend-paying euro area banks caused by the dividend ban announcement. This is in line with hypothesis H1. Furthermore, we find that the impact on the valuation of dividend-paying banks persists through April, but has largely disappeared by the end of May.

[19] Using NFCs as a control group, Andreeva et al. (2023) report a negative impact of the dividend ban on euro area bank stock prices of 7%.

Table 3: Impact of the dividend ban on market valuations

Dependent variable:				Cumulative return				
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Explanatory variables								
Post × D^{ExpDiv}	-5.6405***					-5.6696**	-5.6273**	-2.4770
	(1.7657)					(2.1654)	(2.4306)	(2.5721)
Post × ExpDivYield		-0.4492						
		(0.3105)						
Post × ExpPOR			0.0035					
			(0.0102)					
Post × D^{Bank}				-4.7666***	-5.6129***			
				(1.1769)	(1.2883)			
Regression setup								
Sample	Banks	Banks	Banks	(Non-)banks	(Non-)banks	Banks	Banks	Banks
Exp dividend only	No	No	No	No	Yes	No	No	No
End of period	1 week	1 week	1 week	1 week	1 week	2 weeks	End April	End May
Fixed effects								
Bank	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Day	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fit statistics								
R^2	0.7357	0.7275	0.7212	0.7430	0.7506	0.7562	0.7583	0.7289
Observations	558	558	558	1,008	846	868	1,488	3,038

This table shows the results of the estimation of eq.(6). The numbers in parentheses are standard errors, clustered at bank level. *, ** and *** indicate significance at 10%, 5% and 1% respectively

5.2. Syndicated loans analysis

In this subsection, we discuss to what extent the ECB dividend ban had an effect on bank credit supply in the syndicated loan market.

First, in column (1) of Table 4, we estimate a basic version of eq.(7) in which, next to the interaction term between the expected dividend and post-dividend-ban dummies, only loan currency, loan purpose, loan type, bank, and industry-country-quarter fixed effects are included. In column (2), the specification is extended by including bank control variables. This specification constitutes the baseline for our analysis. In line with hypothesis H2, we find a highly significant positive coefficient (of approximately 0.30) on the interaction of interest. This implies that the ECB dividend ban caused a 30% increase in the credit supply (loan amounts) of treated banks, i.e. banks which would have distributed a dividend to their shareholders in normal times but experienced an unantipicated increase in their capital buffer caused by the dividend payout restriction. In columns (3) and (4), we replace the dummy variable, which indicates whether or not each bank was expected to pay a dividend, by continuous variables capturing the level of the expected payout. More specifically, we use the expected payout ratio in column (3) and the expected dividend yield in column (4). Both specifications confirm that banks with higher expected dividends have increased their credit supply more following the dividend ban.

In the second part of Table 4, we investigate whether the large drop in banks' stock market valuations following the dividend ban announcement had implications for credit supply in the syndicated loan market. In columns (5) to (7), we add interactions between the CAR of the bank in the aftermath of the dividend ban announcement and the $Post_t$ indicator to our baseline regression. Based on hypothesis H2.1, we expect a significantly negative coefficient on the interaction between the CAR and $Post_t$, indicating that banks whose market values are hit harder by the dividend ban announcement would increase their credit supply to a lower extent, thus partially counteracting the baseline positive effect of the dividend ban. However, the results in columns (5) to (7), which differ with respect to the event window which is chosen for the CAR, show that the negative impact of the dividend ban announcement on market values had little to no impact on credit supply in the syndicated loan market. The baseline positive effect of the dividend ban on credit supply is confirmed in these regressions.[20] Finally, in columns (8) and (9), we replace the expected dividend dummy by the continuous treatment indicator (expected payout ratio or expected dividend yield). Again, we conclude that the dividend ban had a positive effect on treated banks' credit supply, without evidence of substantial negative side effects via banks' market valuations, in contrast with hypothesis H2.1. In terms of the bank control variables, we find that larger banks are estimated to provide larger loan amounts. However, most bank controls are not significant, which is not surprising given the rather short sample period and the inclusion of bank fixed effects in all specifications.

In Table 5, we add several interactions between end-2019 bank variables and the $Post_t$ dummy to the baseline specification. We start by estimating regressions in which only double interactions are added. These specifications can be interpreted as horse races, where we test whether or not the effect of the dividend ban remains significant when controlling for potential alternative explanations. Put

[20]Note that triple interactions show the same picture: the interaction between the expected dividend dummy and $Post_t$ remains highly significant, while the interaction between the CAR and $Post_t$ and the triple interaction are not significant. Results available on request.

Table 4: Impact of the dividend ban on syndicated lending

Dependent variable	Ln of 1 + total loan amount								
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Explanatory variables									
Post × D^{ExpDiv}	0.3482***	0.2954***			0.3720***	0.3233**	0.3747**		
	(0.0918)	(0.1051)			(0.1194)	(0.1212)	(0.1463)		
Post × ExpPOR			0.0036**					0.0039**	
			(0.0017)					(0.0018)	
Post × ExpDivYield				0.0313*					0.0401**
				(0.0154)					(0.0186)
Post × CAR[-1,1]					-0.0098			-0.0070	-0.0093
					(0.0083)			(0.0068)	(0.0069)
Post × CAR[0,2]						-0.0033			
						(0.0078)			
Post × CAR[-1,2]							0.0068		
							(0.0083)		
Bank equity/assets		-0.0299	-0.0412	-0.0321	-0.0218	-0.0308	-0.0590	-0.0355	-0.0256
		(0.0434)	(0.0479)	(0.0475)	(0.0434)	(0.0428)	(0.0618)	(0.0483)	(0.0475)
Bank size		1.2290**	1.2032**	1.2997**	1.0092	1.1734*	1.2512**	1.0410	1.1127*
		(0.5892)	(0.5776)	(0.5741)	(0.6371)	(0.6039)	(0.5628)	(0.6250)	(0.6267)
Bank loans/assets		0.0000	-0.0006	0.0000	-0.0012	-0.0008	0.0005	-0.0017	-0.0010
		(0.0116)	(0.0112)	(0.0116)	(0.0115)	(0.0120)	(0.0118)	(0.0111)	(0.0115)
Bank deposits/assets		0.0051	0.0057	0.0071	0.0003	0.0053	0.0051	0.0028	0.0030
		(0.0132)	(0.0140)	(0.0139)	(0.0147)	(0.0130)	(0.0128)	(0.0148)	(0.0150)
Bank cash/assets		-0.0059	0.0009	-0.0010	-0.0025	-0.0067	-0.0048	0.0048	0.0033
		(0.0131)	(0.0143)	(0.0139)	(0.0143)	(0.0133)	(0.0130)	(0.0159)	(0.0156)
Fixed effects									
Loan currency	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan purpose	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan type	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Country-Quarter	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fit statistics									
R^2	0.6970	0.6970	0.6970	0.6969	0.6971	0.6970	0.6970	0.6970	0.6970
Observations	8,806	8,784	8,784	8,784	8,784	8,784	8,784	8,784	8,784

This table shows the results of the estimation of eq.(7) and eq.(8). The numbers in parentheses are standard errors, clustered at bank level. *, ** and *** indicate significance at 10%, 5% and 1% respectively.

differently, we test whether other bank variables are (partially) responsible for the effect currently attributed to the dividend ban. Based on the insignificance of the interactions using banks' level of capital adequacy, size, non-performing loans ratio or distance to the MDA threshold in columns (1) to (4), we can conclude that this is not the case. Moreover, the effect on the main interaction remains very stable and highly significant.[21] In the second part of Table 5, we add triple interactions using these end-2019 bank variables. With these triple interactions, we investigate heterogeneous effects across banks, i.e. we examine to what extent the impact of the dividend ban on credit supply

[21]The results are similar when using dummy variables distinguishing banks above versus below the median for each of these bank variables.

depends on bank characteristics, as described in hypothesis H2.2. In columns (5) to (8) we do not find that the credit supply of banks with higher capital ratios, larger size, higher non-performing loans or a larger distance to the MDA threshold reacted differently to the dividend ban. We can conclude that euro area banks affected by the dividend restriction used their additional capital buffers to expand lending, irrespective of their prior risk profile.

Table 5: Impact of the dividend ban on syndicated lending - horse races and bank heterogeneity

Dependent variable	Ln of 1 + total loan amount							
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Explanatory variables								
Post × D^{ExpDiv}	0.2809^{**}	0.2896^{**}	0.2960^{***}	0.2710^{**}	0.4839^{**}	0.5423^{***}	0.3141^{***}	0.5270^{**}
	(0.1034)	(0.1139)	(0.1075)	(0.1284)	(0.2009)	(0.1905)	(0.0850)	(0.2057)
Post × Bank CET1/RWA	-0.0238				-0.2613			
	(0.0214)				(0.2258)			
Post × Bank size		-0.0174				0.1261		
		(0.0385)				(0.1100)		
Post × Bank NPL/loans			-0.0009				-0.0256	
			(0.0213)				(0.0245)	
Post × Bank MDA distance				-0.0134				-0.1402
				(0.0254)				(0.1004)
Post × D^{ExpDiv} × Bank CET1/RWA					0.2385			
					(0.2274)			
Post × D^{ExpDiv} × Bank size						-0.1501		
						(0.1128)		
Post × D^{ExpDiv} × Bank NPL/loans							0.0344	
							(0.0259)	
Post × D^{ExpDiv} × Bank MDA distance								0.1307
								(0.1029)
Bank equity/assets	-0.0082	-0.0360	-0.0301	-0.0215	-0.0230	-0.0565	-0.0477	-0.0426
	(0.0471)	(0.0425)	(0.0443)	(0.0427)	(0.0577)	(0.0547)	(0.0538)	(0.0566)
Bank size	1.1987^{**}	1.2748^{**}	1.2309^{**}	1.9144^{***}	1.1797^{**}	1.2655^{**}	1.1819^{*}	1.9093^{***}
	(0.5702)	(0.5505)	(0.5978)	(0.5668)	(0.5753)	(0.5533)	(0.6068)	(0.5657)
Bank loans/assets	-0.0003	-0.0002	0.0000	-0.0011	0.0000	0.0001	0.0003	-0.0007
	(0.0116)	(0.0116)	(0.0116)	(0.0126)	(0.0118)	(0.0118)	(0.0118)	(0.0128)
Bank deposits/assets	0.0005	0.0063	0.0051	0.0030	-0.0001	0.0058	0.0040	0.0025
	(0.0125)	(0.0132)	(0.0132)	(0.0123)	(0.0129)	(0.0135)	(0.0136)	(0.0127)
Bank cash/assets	-0.0032	-0.0069	-0.0060	-0.0100	-0.0010	-0.0043	-0.0021	-0.0071
	(0.0128)	(0.0121)	(0.0135)	(0.0135)	(0.0136)	(0.0132)	(0.0153)	(0.0147)
Fixed effects								
Loan currency	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan purpose	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan type	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Country-Quarter	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fit statistics								
R^2	0.6970	0.6970	0.6970	0.7033	0.6971	0.6970	0.6970	0.7033
Observations	8,784	8,784	8,784	8,128	8,784	8,784	8,784	8,128

This table shows the results of the estimation of eq.(9). The numbers in parentheses are standard errors, clustered at bank level. *, ** and *** indicate significance at 10%, 5% and 1% respectively.

In a difference-in-differences specification, a key assumption is the so-called ‘parallel trend’. According to the parallel trend assumption, credit supply for banks in the treatment group (i.e. banks with expected dividend) and control group (i.e. banks without expected dividend) should have followed a similar path before the treatment (i.e. before the dividend ban) and should have followed a similar path if there had been no treatment. While the latter cannot be tested, it is possible to investigate the former by interacting the treatment dummy with separate quarterly dummies instead of one $Post_t$ dummy. Moreover, these interactions allow to test for e.g. a delayed effect and thus to examine the impact of the dividend ban in a more dynamic way. As can be seen in Figure 1, the increase in credit supply by treated banks occurs only after the announcement of the dividend ban (end of March 2020), with the effect being the strongest in the second and third quarter of 2020. In the quarters before the dividend announcement, no significant effect is found, which supports the parallel trend hypothesis.

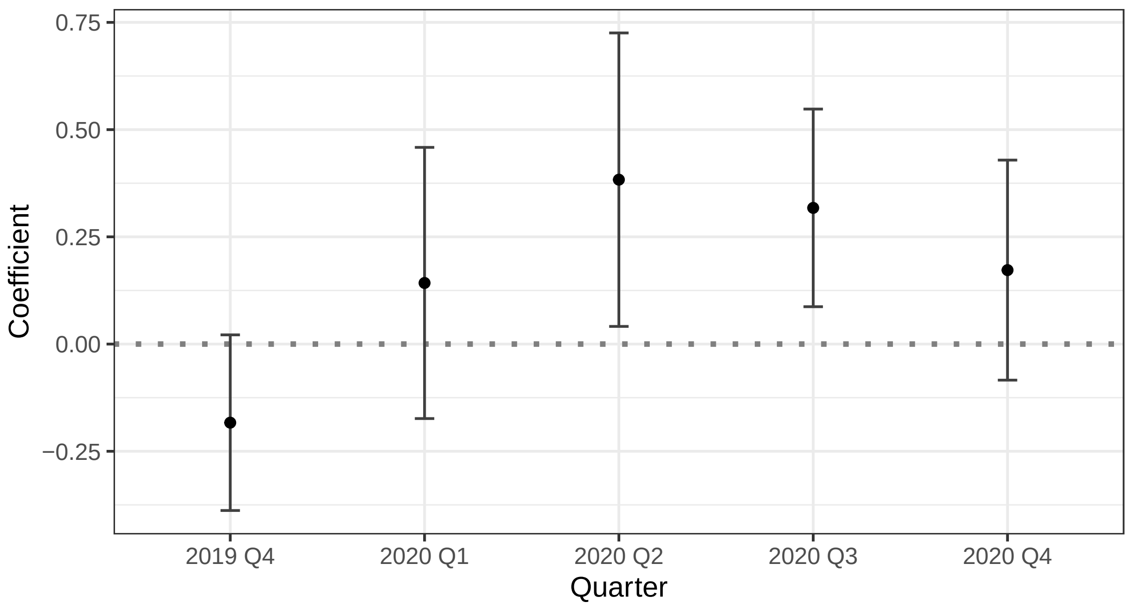

Figure 1: Syndicated lending - parallel trend

6. Robustness

6.1. Stock market analysis

In this section, we perform multiple robustness checks to assess the validity of our findings in section 5.1. Overall, we find that our results are robust across different specifications, which confirms hypothesis H1 that the dividend ban is associated with a negative valuation impact for euro area banks.

Our baseline event study consists of a CAPM framework with an estimation window of 150 days and an event window of 3 days around the event date of March 30 2020. For robustness, we also estimate other specifications, which include variations of the event window, an estimation window of 250 days, and (C)AARs estimated using a Fama and French 3-factor model instead of the CAPM 1-factor model. The results can be found in Tables 6 to 9. We find very stable negative (C)AARs across all specifications, with the highest and statistically significant impact on the first trading day after the announcement (March 30), supporting the results discussed in section 5.1.

Table 6: Event window [0,2]

Day	**March 30**	**March 31**	**April 1**	**Full window**
(C)AAR	-4.46	-0.85	-0.06	-5.37
Test statistics				
BMP	-8.36***	-2.45**	0.25	-6.33***
Adj BMP (K&P)	-2.18**	-0.64	0.06	-1.65
Rank Z	-2.59***	-0.69	0.19	-1.78*
Gen Sign Z	-5.57***	-1.76*	0.78	-4.30***

The first panel of this table shows the average abnormal return on March 30, March 31 and April 1, as well as the cumulative average abnormal return over the full 3-day event window. We use a 1-factor CAPM model and a 150-day estimation window. In the second panel, we show the corresponding test statistics (null hypothesis: (C)AAR = 0), based on Boehmer et al. (1991), Kolari & Pynnönen (2010), Corrado & Zivney (1992), and Cowan (1992). They are denoted by BMP, Adj BMP (K&P), Rank Z and Gen Sign Z respectively. *, ** and *** indicate significance at 10%, 5% and 1% respectively.

Next, we perform a cross-sectional regression analysis to investigate the drivers of the post-dividend ban valuation impact. In Table 10, the dependent variable is the CAR, as estimated in

Table 7: Event window [-1,2]

Day	**March 27**	**March 30**	**March 31**	**April 1**	**Full window**
(C)AAR	0.17	-4.46	-0.85	-0.06	-5.20
Test statistics					
BMP	0.34	-8.36***	-2.45**	0.25	-5.41***
Adj BMP (K&P)	0.09	-2.18**	-0.64	0.06	-1.41
Rank Z	0.00	-2.60***	-0.69	0.19	-1.55
Gen Sign Z	-0.23	-5.57***	-1.76*	0.78	-3.53***

The first panel of this table shows the average abnormal return on March 27, March 30, March 31 and April 1, as well as the cumulative average abnormal return over the full 4-day event window. We use a 1-factor CAPM model and a 150-day estimation window. In the second panel, we show the corresponding test statistics (null hypothesis: (C)AAR = 0), based on Boehmer et al. (1991), Kolari & Pynnönen (2010), Corrado & Zivney (1992), and Cowan (1992). They are denoted by BMP, Adj BMP (K&P), Rank Z and Gen Sign Z respectively. *, ** and *** indicate significance at 10%, 5% and 1% respectively.

Table 8: Fama and French 3-factor model

Day	**March 27**	**March 30**	**March 31**	**Full window**
(C)AAR	-0.12	-1.71	-1.63	-3.47
Test statistics				
BMP	-0.48	-4.57***	-4.40***	-4.50***
Adj BMP (K&P)	-0.21	-1.97*	-1.90*	-1.95*
Rank Z	0.10	-1.92*	-2.00**	-2.20**
Gen Sign Z	0.53	-2.52**	-2.77***	-2.52**

The first panel of this table shows the average abnormal return on March 27, March 30 and March 31, as well as the cumulative average abnormal return over the full 3-day event window. We use a 3-factor Fama and French model and a 150-day estimation window. In the second panel, we show the corresponding test statistics (null hypothesis: (C)AAR = 0), based on Boehmer et al. (1991), Kolari & Pynnönen (2010), Corrado & Zivney (1992), and Cowan (1992). They are denoted by BMP, Adj BMP (K&P), Rank Z and Gen Sign Z respectively. *, ** and *** indicate significance at 10%, 5% and 1% respectively.

section 5.1.[22] We include bank size and the equity ratio as control variables in all regressions. The coefficient of bank size is always negative and significant at the 1% significance level, indicating that larger banks experienced a more negative valuation impact caused by the dividend ban announcement. In column (1) of Table 10, we add a dummy variable which indicates whether the bank was expected to pay out a dividend in 2020. This dummy variable has a significant, negative coefficient,

[22]We obtain qualitatively similar results when using variations of the baseline as the dependent variable across the specifications.

Table 9: Estimation window of 250 trading days

Day	**March 27**	**March 30**	**March 31**	**Full window**
(C)AAR	0.06	-4.41	-0.79	-5.14
Test statistics				
BMP	-0.16	-8.40***	-2.31**	-6.08***
Adj BMP (K&P)	-0.04	-2.15**	-0.59	-1.56
Rank Z	-0.13	-2.54**	-0.62	-1.89*
Gen Sign Z	-0.77	-5.59***	-1.53	-4.07***

The first panel of this table shows the average abnormal return on March 27, March 30 and March 31, as well as the cumulative average abnormal return over the full 3-day event window. We use a 1-factor CAPM model and a 250-day estimation window. In the second panel, we show the corresponding test statistics (null hypothesis: (C)AAR = 0), based on Boehmer et al. (1991), Kolari & Pynnönen (2010), Corrado & Zivney (1992), and Cowan (1992). They are denoted by BMP, Adj BMP (K&P), Rank Z and Gen Sign Z respectively. *, ** and *** indicate significance at 10%, 5% and 1% respectively.

indicating that the valuation impact was more negative for dividend-paying banks. However, the results in column (2) and (3) show that neither the level of the expected dividend yield nor the payout ratio are significant drivers of the CAR, which is in line with the results in section 5.1. Next, in column (4), we add a set of bank-specific variables. We include the amount of loans, cash and deposits each bank holds, measured against their total assets. The coefficients of these variables are not significant, indicating that they do not affect the post-announcement returns of banks. Finally, we include the banks' ownership structure. We focus on ownership concentration by including a Herfindahl-Hirschman Index (HHI) and we also include the percentage of institutional investors in the ownership structure of the respective banks.[23] In the literature, it is found that banks that issue more dividends are associated with a higher percentage of institutional ownership (Short et al., 2002; Mücke, 2023). Furthermore, institutional ownership is more concentrated in banks with higher capital levels, and these banks are found to be more often paying a dividend compared to lower-capitalized banks (Garel et al., 2022). For the dividend ban however, our results indicate that the CARs are not driven by differences in ownership structure.[24]

[23] End-2019 ownership variables are obtained from Refinitiv.

[24] When we add the dividend dummy to the specifications in column (4) and (5), the dummy remains highly statistically significant, without meaningful changes in the coefficients of the other variables.

Table 10: Cross-sectional regression analysis with CAR

Dependent variable	Cumulative abnormal return				
Model	(1)	(2)	(3)	(4)	(5)
Explanatory variables					
Constant	35.9876***	28.9222***	28.2228***	23.8110	27.6191***
	(7.9015)	(8.6151)	(8.8050)	(18.2384)	(9.3106)
Bank size	-1.9681***	-1.8905***	-1.9469***	-1.8174***	-1.8283***
	(0.3734)	(0.4161)	(0.4148)	(0.5866)	(0.4482)
Equity/Assets	-0.1137	0.1757	0.1900	0.0670	0.1868
	(0.2526)	(0.2916)	(0.2958)	(0.4069)	(0.3015)
D^{ExpDiv}	-6.0984***				
	(1.8972)				
ExpDivYield		-0.3294			
		(0.2481)			
ExpPOR			0.0027		
			(0.0093)		
Loans/Assets				-0.0231	
				(0.0912)	
Cash/Assets				-0.1233	
				(0.1179)	
Deposits/Assets				0.0871	
				(0.0875)	
HHI ownership					0.0000
					(0.0004)
Institutional investors					0.0481
					(0.0356)
Fit statistics					
R^2	0.4032	0.3200	0.2960	0.3154	0.3087
Observations	62	62	62	55	62

This table shows the results of cross-sectional regressions of the cumulative abnormal return (1-factor CAPM model, 3-day event window, 150-day estimation window) on several bank characteristics. The numbers in parentheses are heteroskedasticity-robust standard errors. *, ** and *** indicate significance at 10%, 5% and 1% respectively.

6.2. Syndicated loans analysis

In this subsection, we show that the positive effect of the ECB dividend ban on credit supply is robust to a variety of checks, including adding firm controls and more granular fixed effects, different ways of structuring the dataset, and matching strategies to make treatment and control group more comparable. Finally, we also extend the sample to include non euro area banks.

In Table 11, we first repeat the baseline specification in column (1), which includes bank control variables, loan currency, loan purpose, loan type, bank and industry-country-quarter fixed effects. In column (2), we replace the industry-country-quarter fixed effects by industry-country-size-quarter fixed effects, which allows to control for credit demand in a more granular way. In columns (3) and (4), we add firm control variables to the specification, with industry-country-quarter and industry-country-size-quarter fixed effects, respectively. Firms' size, debt-to-asset ratio, and profitability seem to have a positive effect on the amount of credit. Overall, the results are very similar to the baseline and the effect of the dividend ban remains between 20% and 30%. Finally, in columns (5) to (7), we again include interactions between the CAR and $Post_t$, in addition to the firm control variables and the most granular fixed effects. In column (5), we find some limited evidence (using the [-1,1] event window) of a counteracting effect of the dividend ban on credit supply via banks' market valuations. However, the order of magnitude of the baseline effect remains highly statistically significant and dominates in terms of magnitude.[25] Moreover, this counteracting effect is unstable and its significance disappears when alternative event windows are considered, as shown in columns (6) and (7). As discussed before, a caveat of the inclusion of firm controls is that it causes the number of observations to drop significantly and that the resulting sample is tilted towards European firms. Therefore, the use of firm controls is limited to the robustness checks in Table 11.

Second, we show that the main result remains qualitatively similar when we structure the syndicated loans dataset in a different way or when we make other choices regarding the weighting of observations. As a recap, our baseline specification is run at loan level, only focuses on lead banks (where a loan is repeated multiple times if there are multiple leads) and is estimated using WLS, with the weights inversely proportional to the number of leads in the final dataset, implying that every loan receives a total weight of 1. In column (1) of Table 12, we estimate the baseline specification with ordinary least squares (OLS) instead of WLS. As a result, loans with multiple lead banks receive a higher total weight. In column (2), we include all lenders (leads and participants) and estimate the baseline regression using WLS, with weights inversely proportional to the number of lenders. In columns (3) to (6), total loan amounts are first split over all participating banks. Subsequently, we estimate OLS regressions using bank-specific loan amounts as dependent variable. To split loan amounts among banks, we follow the existing literature (e.g. Gropp et al. (2019)).

[25] As an example, the impact on the credit supply of the average bank with expected dividend payment (which has a CAR of -6.63%, cf. Section 5.1) is expected to be 21% (= $0.2702 - 0.0085 \times 6.63$).

Table 11: Impact of the dividend ban on syndicated lending - additional firm controls

Dependent variable	Ln of 1 + total loan amount						
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Explanatory variables							
Post × D^{ExpDiv}	0.2954***	0.2274**	0.2870***	0.2084**	0.2702***	0.2269**	0.2156*
	(0.1051)	(0.0852)	(0.0796)	(0.0846)	(0.0854)	(0.0866)	(0.1124)
Post × CAR[-1,1]					-0.0085**		
					(0.0032)		
Post × CAR[0,2]						-0.0024	
						(0.0026)	
Post × CAR[-1,2]							0.0006
							(0.0046)
Bank equity/assets	-0.0299	-0.0061	0.0119	-0.0437	-0.0382	-0.0452	-0.0462
	(0.0434)	(0.0466)	(0.0488)	(0.0462)	(0.0436)	(0.0456)	(0.0547)
Bank size	1.2290**	0.4128	0.9960	0.4327	0.3104	0.4221	0.4334
	(0.5892)	(0.3818)	(0.6198)	(0.4224)	(0.4166)	(0.4249)	(0.4226)
Bank loans/assets	0.0000	0.0064	0.0061	0.0105***	0.0093***	0.0099***	0.0106***
	(0.0116)	(0.0053)	(0.0071)	(0.0037)	(0.0033)	(0.0035)	(0.0038)
Bank deposits/assets	0.0051	-0.0061	-0.0127	-0.0028	-0.0066	-0.0027	-0.0027
	(0.0132)	(0.0105)	(0.0123)	(0.0083)	(0.0070)	(0.0083)	(0.0082)
Bank cash/assets	-0.0059	-0.0083	0.0083	-0.0040	-0.0013	-0.0046	-0.0039
	(0.0131)	(0.0113)	(0.0114)	(0.0102)	(0.0096)	(0.0103)	(0.0099)
Firm size			0.2863***	0.2766***	0.2753***	0.2764***	0.2766***
			(0.0149)	(0.0338)	(0.0338)	(0.0338)	(0.0338)
Firm debt/assets			0.0096***	0.0127***	0.0127***	0.0127***	0.0127***
			(0.0021)	(0.0023)	(0.0023)	(0.0023)	(0.0023)
Firm ROA			0.0400***	0.0533***	0.0530***	0.0532***	0.0533***
			(0.0056)	(0.0075)	(0.0074)	(0.0075)	(0.0075)
Fixed effects							
Loan currency	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan purpose	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan type	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Country-Quarter	Yes		Yes				
Industry-Country-Size-Quarter		Yes		Yes	Yes	Yes	Yes
Fit statistics							
R^2	0.6970	0.8407	0.8229	0.8578	0.8578	0.8578	0.8578
Observations	8,784	5,416	5,647	5,298	5,298	5,298	5,298

This table shows the results of the estimation of eq.(7) and eq.(8). The numbers in parentheses are standard errors, clustered at bank level. *, ** and *** indicate significance at 10%, 5% and 1% respectively.

First, when loan shares are available, we split the loan amounts accordingly among all lenders. When loan shares are unknown for some or all of the participating banks, we split the (remaining) loan amount equally over all (remaining) banks.[26] Using this new setup, we re-estimate eq.(7) in

[26] Sometimes loan shares are available for all banks but they sum to less than 100%, or loan shares sum to more than 100%. In that case, we rescale the given loan shares to make sure they sum to 100% within a tranche.

column (3), which focuses on leads only, whereas we include all lenders in column (4). Subsequently, we collapse our loan level dataset to the bank-firm-quarter level, which implies that different loans given by the same bank to the same firm in the same quarter are summed.[27] This alternative structure is used by, among others, Beck & Keil (2022) and Kacperczyk & Peydró (2022). The results are shown in column (5). Finally, column (6) allows to extend the analysis beyond the intensive margin. Until now, we did not include bank-firm relationships for which there was no loan. Hence, we were only able to capture the intensive margin, i.e our analysis provided insights on whether banks increase or decrease the size of their loans, conditional on providing a loan. In column (6), we deviate from this approach and also include bank-firm-quarter observations with zero loan amounts, provided that there is at least one other quarter in which there is a non-zero observation, which allows to capture a combination of intensive and extensive margin, in line with Fraisse et al. (2020). Overall, the regressions in columns (1) to (6) indicate that, regardless of the approach, the effect of the dividend ban on banks' credit supply remains significantly positive and economically meaningful, ranging between approximately 13% and 31%.

Subsequently, in column (7) and (8) of Table 12, we provide further evidence on the effect of the dividend ban on the extensive margin of credit supply. In column (7), we run the analysis at the bank-firm-quarter level and replace the dependent variable by a dummy which captures whether the bank issued a new loan to that firm in that quarter. This analysis suggests that the dividend ban also created additional credit supply along the extensive margin. However, in column (8), when replacing this simple dummy by the number of loans for each bank-firm pair in every quarter, the resulting coefficient is (borderline) no longer significant at the 10% level. Finally, based on columns (9), we can conclude that the dividend ban had no significant impact on the all-in-spread-drawn (AISD) of newly issued loans.[28] We should, however, be cautious about the latter conclusion, given the very limited number of loans for which the AISD is available and the associated drop in observations in the analysis.

[27] Hence, loan currency, loan purpose and loan type fixed effects can no longer be included.

[28] Results for the AISD are robust to including the natural logarithm of the loan amount and the maturity as loan controls in the specification, in line with Degryse et al. (2023a). Unreported robustness checks also show that the dividend ban had no significant effect on the maturity of new syndicated loans.

Table 12: Impact of the dividend ban on syndicated lending - alternative structure and dependent variables

Dependent variable	Ln of 1 + total loan amount		Ln of 1 + loan amount per bank				D^{loan}	N loans	AISD
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Explanatory variables									
Post × D^{ExpDiv}	0.1449**	0.3077***	0.1854**	0.1867***	0.1267***	0.1345***	0.0349***	0.0432	-22.1902
	(0.0641)	(0.0811)	(0.0689)	(0.0574)	(0.0418)	(0.0398)	(0.0125)	(0.0270)	(19.7069)
Bank equity/assets	-0.0027	0.0069	0.0102	0.0478	0.0384	-0.0099	-0.0053	0.0026	16.4510**
	(0.0306)	(0.0560)	(0.0310)	(0.0342)	(0.0431)	(0.0218)	(0.0062)	(0.0119)	(7.5537)
Bank size	0.3479	1.5362***	0.4028	0.6781**	0.2809	0.0925	0.0259	0.0762	-105.4558
	(0.3886)	(0.4097)	(0.2919)	(0.2973)	(0.2543)	(0.1467)	(0.0450)	(0.1320)	(69.8189)
Bank loans/assets	-0.0025	0.0002	-0.0031	-0.0024	-0.0082**	-0.0027	-0.0001	-0.0016	-2.9478***
	(0.0073)	(0.0075)	(0.0050)	(0.0042)	(0.0037)	(0.0036)	(0.0008)	(0.0018)	(0.6983)
Bank deposits/assets	-0.0031	0.0083	-0.0133*	-0.0168**	-0.0010	0.0019	0.0005	0.0029	-0.6343
	(0.0087)	(0.0134)	(0.0067)	(0.0077)	(0.0086)	(0.0030)	(0.0009)	(0.0020)	(0.6104)
Bank cash/assets	0.0137	-0.0379**	0.0127	-0.0050	-0.0047	-0.0179***	-0.0051***	-0.0070*	3.8718***
	(0.0107)	(0.0168)	(0.0078)	(0.0086)	(0.0091)	(0.0054)	(0.0015)	(0.0035)	(0.9759)
Fixed effects									
Loan currency	Yes	Yes	Yes	Yes					Yes
Loan purpose	Yes	Yes	Yes	Yes					Yes
Loan type	Yes	Yes	Yes	Yes					Yes
Bank	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Country-Quarter	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regression setup									
Banks	Leads	All	Leads	All	All	All	All	All	Leads
Weights	No	Yes	No	No	No	No	No	No	Yes
Level of analysis	Loan	Loan	Loan	Loan	BFQ	BFQ	BFQ	BFQ	Loan
Margin	Int	Int	Int	Int	Int	Int/Ext	Ext	Ext	Int
Fit statistics									
R^2	0.7170	0.6787	0.6423	0.6256	0.6777	0.3679	0.3538	0.3001	0.9139
Observations	8,784	11,135	8,784	11,135	6,490	37,074	37,074	37,074	1,483

This table shows the results of the estimation of eq.(7) or alternatives thereof. The numbers in parentheses are standard errors, clustered at bank level. *, ** and *** indicate significance at 10%, 5% and 1% respectively.

As an additional robustness check, we investigate to what extent our results are driven by certain sample choices. First, we acknowledge that the treatment group (34 lead banks with expected dividend) is much larger than the control group (6 lead banks without expected dividend) in our baseline setup. Consequently, depending on the exact model, only between 5% and 10% of the observations are assigned to the control group. Moreover, even though we test several alternative explanations (cf. horse races in Table 5) and include quarterly bank controls in the baseline specification, our results might be driven by the fact that treated and control banks significantly differ in certain aspects. As an example, following Abreu & Gulamhussen (2013) and Gambacorta et al. (2020), we might be concerned that banks with an expected dividend are larger in size or have higher profitability than banks which were not expected to pay a dividend. Indeed, as shown in the columns (1) and (2) of Table 13, there are a number of significant differences between the banks in the treatment (expected dividend) and control (no expected dividend) group. More specifically, banks in the treatment group have a significantly higher profitability, as well as lower overall capital requirements (OCR, as a percentage of RWA) and a lower P2R.[29]

Table 13: Mean value of key variables in subsamples

	(1) No ExpDiv No matching	(2) ExpDiv No matching	(3) ExpDiv Matching M1	(4) ExpDiv Matching M2	(5) ExpDiv Matching M3
Size	17.97	19.01	19.09	19.28	18.61
ROA	-0.21	0.53**	0.28	0.25	0.26
Loans/assets	64.33	60.93	64.38	60.77	65.98
Deposits/assets	73.17	66.67	67.93	63.82	73.27
Cash/assets	14.31	11.86	12.08	11.82	11.58
Equity/assets	9.71	7.51	6.55	6.41	7.54
MDA distance	3.81	4.28	4.66	4.04	4.56
OCR	10.81	9.96*	10.00	10.50	10.39
P2R	2.69	1.95**	1.92**	2.03**	2.36

This table shows, for a set of key variables, the mean in different subsamples: banks without expected dividend in column (1), banks with expected dividend in column (2), banks with expected dividend and matching based on ROA (M1) in column (3), banks with expected dividend and matching based on ROA and OCR (M2) in column (4), banks with expected dividend and matching based on ROA, OCR and P2R (M3) in column (5). In columns (2) to (5), we indicate significant differences compared to column (1), with *, ** and *** indicating significance at 10%, 5% and 1% respectively, based on the Welch-Satterthwaite test.

To address both issues, we employ a nearest neighbour matching algorithm where we include, for each bank in the control group, three banks in the treatment group which are closest based on several variables. The results are shown in Table 14. In column (1), matched banks in the treatment group are chosen based on their similarity to banks in the control group in terms of ROA (M1). In column (2), we match banks on ROA and OCR (M2), and in column (3) on a combination of ROA, OCR and P2R (M3).[30] In columns (1) to (3) of Table 14, we show that the effect of the dividend ban on syndicated lending remains significant in these matched subsamples. Finally, in columns (4) to (6) and columns (7) to (9), we repeat the same matching procedures and replace the expected dividend dummy by the expected payout ratio and expected dividend yield, respectively,

[29] Given the capital relief package announced by the ECB a few weeks before the dividend ban announcement, it is important to make sure that these differences are not responsible for the credit supply effect attributed to the dividend ban.

[30] To determine these nearest neighbours, we calculate for each of the variables (after standardization) the deviation between the control bank and each of the treatment banks. Subsequently, for each control bank, we select the three treatment banks for which the sum of squared deviations (over all variables considered) is the lowest.

which yields qualitatively similar results. As can be seen in Table 13, the matching procedure is able to close the gap between the control group and matched treatment group regarding these key variables.

Table 14: Impact of the dividend ban on syndicated lending - matched treatment and control group

Dependent variable	Ln of 1 + total loan amount								
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Explanatory variables									
Post × D^{ExpDiv}	0.5272^{*}	0.3012^{*}	0.5980^{*}						
	(0.2500)	(0.1500)	(0.2856)						
Post × ExpPOR				0.0123^{***}	0.0058^{**}	0.0117^{***}			
				(0.0029)	(0.0026)	(0.0032)			
Post × ExpDivYield							0.0982^{**}	0.0256	0.1391^{***}
							(0.0342)	(0.0227)	(0.0333)
Bank equity/assets	0.0345	0.2338	-0.2578^{***}	-0.0728	0.2478	-0.1098	0.0063	0.2730	-0.1732^{*}
	(0.2102)	(0.1546)	(0.0859)	(0.1908)	(0.1694)	(0.0818)	(0.1658)	(0.1542)	(0.0907)
Bank size	3.4775	0.7387	1.0929	4.1786	1.2666	3.2325	4.6848^{*}	1.3234	2.9314
	(2.4935)	(1.1695)	(2.9088)	(2.6313)	(1.2796)	(2.6611)	(2.5328)	(1.2305)	(2.7226)
Bank loans/assets	0.0568^{*}	-0.0167	0.0260	0.0826^{**}	-0.0143	0.0591^{**}	0.0948^{**}	-0.0160	0.0533^{**}
	(0.0297)	(0.0110)	(0.0215)	(0.0270)	(0.0112)	(0.0202)	(0.0341)	(0.0110)	(0.0197)
Bank deposits/assets	-0.0557^{*}	-0.0491	-0.0389	-0.0520^{**}	-0.0398	-0.0252	-0.0447^{*}	-0.0335	-0.0329^{*}
	(0.0266)	(0.0339)	(0.0245)	(0.0193)	(0.0325)	(0.0206)	(0.0239)	(0.0337)	(0.0180)
Bank cash/assets	0.0188	0.0187	-0.0148	0.0204	0.0114	0.0044	0.0212	0.0188	-0.0144
	(0.0483)	(0.0346)	(0.0357)	(0.0548)	(0.0383)	(0.0349)	(0.0449)	(0.0406)	(0.0384)
Fixed effects									
Loan currency	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan purpose	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan type	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Country-Quarter	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regression setup									
Matching	M1	M2	M3	M1	M2	M3	M1	M2	M3
Fit statistics									
R^2	0.7615	0.7412	0.7667	0.7626	0.7413	0.7671	0.7621	0.7411	0.7672
Observations	2,040	3,473	2,004	2,040	3,473	2,004	2,040	3,473	2,004

This table shows the results of the estimation of eq.(7), using matched treatment and control groups. In columns (1), (4) and (7), the matching is based on ROA (M1). In columns (2), (5) and (8), the matching is based on ROA and OCR (M2). In columns (3), (6) and (9), the matching is based on ROA, OCR and P2R (M3). For each bank in the control group, the three closest neighbours in the treatment group are selected. The numbers in parentheses are standard errors, clustered at bank level. *, ** and *** indicate significance at 10%, 5% and 1% respectively.

So far, our analysis has exclusively focused on euro area banks and their reaction after the ECB dividend ban announcement. In the next part, we extend the sample towards other (listed) European banks which are not headquartered in euro area countries.[31] More specifically, we add lead banks located in the United Kingdom, Switzerland, Denmark, Sweden, Norway, Poland, Hungary,

[31] We focus on listed banks, because of the availability of dividend expectations in the Refinitiv database.

Czech Republic, Romania, and Croatia. In all of these countries, bank supervisors requested banks to restrict their dividend distributions and hence they can be included in our analysis. We focus on the impact of the dividend ban announcement on credit supply and do not estimate the stock price reaction of non euro area banks, given the slightly different dates of the announcement in different jurisdictions which could give rise to anticipation or spillover effects. The results of this extension are presented in Table 15. We first show the results for the full sample, focusing on a dummy for banks with an expected dividend in column (1), on the level of expected payout ratio in column (2), and on the expected dividend yield in column (3). The effect of the dividend ban on credit supply is significantly positive in all three specifications. In columns (4) to (6), we restrict the sample to only include loans issued to firms in the EU27, the EU28 (including the UK) or broader Europe. The effect of the dividend ban in this subsample is again significantly positive and even somewhat larger in magnitude, indicating that the dividend ban positively affected credit supply to European firms. Finally, in this more heterogeneous sample, we might be worried that the supervisor's dividend ban announcement was not perceived in the same way in all jurisdictions. Indeed, some banks in this extended sample (more specifically in Switzerland, Norway and Romania) at least partially paid their planned dividends despite the dividend ban. Additionally, 5 Spanish banks also paid out their dividends in the second quarter of 2020, because they had already been approved by the annual general meeting of shareholders before the dividend ban was announced. To make sure that these banks are not confounding our findings, we show in column (7) that our results are qualitatively similar when we omit banks which paid a dividend during 2020 from the sample.[32]

Finally, we discuss three unreported additional robustness checks, of which the results are available on request. First, in the baseline analysis, we cluster standard errors at the bank level, in line with, among others, Gropp et al. (2019) and Heider et al. (2019). This approach is based on Bertrand et al. (2004), who argue that clustering at the level of the treated unit is necessary to correct for serial correlation in a difference-in-differences setup. However, with bank-firm-time level data, the choice on which unit to cluster is not always straightforward. In unreported robustness

[32]Note that the same result holds when we omit these 5 Spanish banks from the baseline euro area sample.

Table 15: Impact of the dividend ban on syndicated lending - extended sample (European banks)

Dependent variable	Ln of 1 + total loan amount						
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Explanatory variables							
Post × D^{ExpDiv}	0.2334**			0.3730**	0.3130**	0.3184**	0.2346**
	(0.1154)			(0.1476)	(0.1367)	(0.1325)	(0.1078)
Post × ExpPOR		0.0026**					
		(0.0012)					
Post × ExpDivYield			0.0264**				
			(0.0128)				
Bank equity/assets	-0.0482	-0.0502	-0.0471	0.0046	-0.0047	0.0011	-0.0616
	(0.0414)	(0.0423)	(0.0425)	(0.0678)	(0.0475)	(0.0499)	(0.0534)
Bank size	0.5588	0.5813	0.6507	1.6082**	1.2396**	1.0678**	0.5053
	(0.5551)	(0.5440)	(0.5379)	(0.6468)	(0.5346)	(0.5212)	(0.5815)
Bank loans/assets	-0.0073	-0.0075	-0.0066	0.0088	0.0078	0.0069	-0.0122
	(0.0126)	(0.0124)	(0.0128)	(0.0118)	(0.0102)	(0.0099)	(0.0114)
Bank deposits/assets	0.0127	0.0128	0.0133	-0.0118	-0.0049	-0.0044	0.0152
	(0.0117)	(0.0121)	(0.0121)	(0.0144)	(0.0118)	(0.0113)	(0.0109)
Bank cash/assets	-0.0004	0.0033	0.0008	0.0084	0.0129	0.0156	-0.0088
	(0.0102)	(0.0103)	(0.0102)	(0.0148)	(0.0131)	(0.0123)	(0.0102)
Fixed effects							
Loan currency	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan purpose	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan type	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Country-Quarter	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample selection							
Firm	All	All	All	EU27	EU28	Europe	All
Bank	All	All	All	All	All	All	Div not paid
Fit statistics							
R^2	0.6892	0.6892	0.6892	0.6500	0.6611	0.6763	0.6835
Observations	11,346	11,346	11,346	6,892	8,246	8,866	9,671

This table shows the results of the estimation of eq.(7), for an extended sample of listed European banks. The numbers in parentheses are standard errors, clustered at bank level. *, ** and *** indicate significance at 10%, 5% and 1% respectively.

checks, we find that the results remain strongly significant when double-clustering at bank and firm level, as in Ferreira & Matos (2012) and Fraisse et al. (2020). Second, to solve this potential issue of serial correlation, Bertrand et al. (2004) also propose to collapse the sample in a single period before and a single period after the event (in our case, the dividend ban) and assess whether changes in the dependent variable are caused by the explanatory variable of interest, a suggestion followed by, among others, Gropp et al. (2019). When using this approach, we again confirm the positive impact of the dividend ban on euro area banks' credit supply. Third, we confirm that our baseline results hold after adding fixed effects for listed firms, interacted with quarterly dummies. These fixed effects are an additional way to control for credit demand, which might depend on whether or not the firm has access to equity markets.

6.3. Economic magnitude

In this subsection, we shed light on the economic magnitude of the impact of the dividend ban. More specifically, we quantify the absolute amount of retained dividends and the aggregate loss in market capitalization following the dividend ban announcement, as well as the additional amount of credit created by the dividend ban in the syndicated loan market.[33]

Using end-2019 dividend expectations, aggregate foregone dividends amount to 35bn USD for the 34 banks with non-zero expected dividend (treatment group) which were active as lead bank in the syndicated loan sample.[34] In reaction to the dividend ban announcement, the aggregate loss in market capitalization for these banks was approximately 41bn USD.[35]

Regarding the impact of the dividend ban on credit supply, our baseline estimates indicate that affected banks' new syndicated loan amounts were approximately 20% to 30% higher during the April 2020 to December 2020 period, compared to the July 2019 to March 2020 period. This is similar to the effect described by Dautovic et al. (2023), who use confidential credit register data to investigate the impact of the dividend ban on the growth of outstanding credit of euro area banks. More specifically, it can be shown that a 20% to 30% increase in new lending approximately corresponds to a 1 to 1.5 percentage points increase in the growth of outstanding credit.[36] The order

[33] Because of the somewhat mixed results at the extensive margin of credit (cf. columns (7) and (8) in Table 12), we assume in this subsection that the full effect of the dividend ban in the syndicated loan market materialized at the intensive margin, i.e via larger loan amounts.

[34] Part of these dividends might also be retained in order to distribute after the lifting of the dividend ban.

[35] Calculated based on the estimated CAR over the [-1,1] event window.

[36] Using data from the Statistical Data Warehouse (SDW) on outstanding loans per maturity bucket, we find that the average maturity of NFC loans is approximately 6.5 years (confirmed using syndicated loan data). This implies that around 3.85% (= 1 / 6.5 / 4) of the outstanding loan amounts needs to be renewed every quarter to have a zero growth rate in outstanding credit. In reality, however, the average quarterly growth rate of outstanding NFC credit in the euro area was 1.22% in 2019 according to SDW data, implying that new loan amounts need to be 5.07% (= 3.85% + 1.22%) of outstanding loans. A 20% to 30% increase in new loan amounts thus corresponds to a 1 (= 20% × 5.07%) to 1.5 (= 30% × 5.07%) percentage points increase in quarterly credit growth.

of magnitude found in this paper is therefore in line with Dautovic et al. (2023), who estimate that outstanding lending growth was 2.1 percentage points higher because of the dividend ban. Moreover, Dautovic et al. (2023) find the effect to be larger for small and medium-sized borrowers, while the syndicated loan market is dominated by large firms.

It should be noted, however, that this 20% to 30% effect is estimated using micro (loan-level) data. Hence, this is an estimate of the effect of the dividend ban on the average loan of the treated lead bank, which does not necessarily translate one-to-one to the effect on aggregate (macro) credit supply. To give a more accurate idea of the effect of the dividend ban on the supply of bank credit at the macro level, we estimate weighted least squares regressions in the spirit of Amiti & Weinstein (2018) and Tielens & Van Hove (2017). More specifically, since the effect on larger loans is more important for aggregate credit supply, we use weights proportional to the size of the loan in overall new credit in each quarter.[37] We compare the results of these size-weighted estimations with our micro-level results in Table 16. First, in column (1), we repeat the baseline specification which shows a micro effect of approximately 30%. In column (2), we estimate a size-weighted version of this specification, which indicates that the positive macro effect of the dividend ban on new syndicated loan amounts is limited to approximately 10%. Similarly, columns (4) and (6) show that the effect of the continuous treatment variables (expected payout ratio and dividend yield) is also smaller, although still highly statistically significant, in the size-weighted regressions compared to the micro-level regressions shown in columns (3) and (5). Finally, in columns (7) and (8), we show that the same reduction in magnitude occurs in the regressions with firm controls and more granular industry-country-size-quarter fixed effects, with the effect of the dividend ban dropping from 21% at the micro level to 7% at the macro level.

Given that the treated lead banks in our sample issued 173bn USD of new syndicated loans in the July 2019 to March 2020 period, this 7% to 10% increase at the macro level implies that the dividend ban caused an increase in loan amounts of 13bn to 16bn USD in the syndicated loan market in the 9 months after its announcement. While this effect may seem rather large in

[37] As before, we still adjust the weights to ensure that loans with multiple leads are not overrepresented.

comparison to the 35bn USD of retained dividends, it should also be noted that banks are only required to hold a small percentage of capital against their (risk-weighted) assets. Indeed, overall capital requirements are on average approximately 10% of RWA for the banks in our sample, as shown in Table 13. Hence, every USD of additional capital has the potential to be transformed into approximately 10 USD of additional risk-weighted assets and thus even more additional lending.

Table 16: Impact of the dividend ban on syndicated lending - micro versus macro level

Dependent variable	Ln of 1 + total loan amount							
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Explanatory variables								
Post × D^{ExpDiv}	0.2954***	0.0951*					0.2084**	0.0724**
	(0.1051)	(0.0519)					(0.0846)	(0.0344)
Post × ExpPOR			0.0036**	0.0026***				
			(0.0017)	(0.0009)				
Post × ExpDivYield					0.0313*	0.0194***		
					(0.0154)	(0.0062)		
Bank equity/assets	-0.0299	0.0083	-0.0412	-0.0034	-0.0321	0.0041	-0.0437	-0.0395
	(0.0434)	(0.0362)	(0.0479)	(0.0380)	(0.0475)	(0.0375)	(0.0462)	(0.0255)
Bank size	1.2290**	0.3094	1.2032**	0.3218	1.2997**	0.3818	0.4327	0.4353
	(0.5892)	(0.3017)	(0.5776)	(0.3126)	(0.5741)	(0.3107)	(0.4224)	(0.3767)
Bank loans/assets	0.0000	-0.0063	-0.0006	-0.0055	0.0000	-0.0054	0.0105***	0.0008
	(0.0116)	(0.0046)	(0.0112)	(0.0046)	(0.0116)	(0.0047)	(0.0037)	(0.0037)
Bank deposits/assets	0.0051	0.0029	0.0057	0.0018	0.0071	0.0031	-0.0028	0.0025
	(0.0132)	(0.0052)	(0.0140)	(0.0047)	(0.0139)	(0.0049)	(0.0083)	(0.0043)
Bank cash/assets	-0.0059	0.0022	0.0009	0.0020	-0.0010	0.0015	-0.0040	-0.0038
	(0.0131)	(0.0081)	(0.0143)	(0.0085)	(0.0139)	(0.0084)	(0.0102)	(0.0075)
Firm size							0.2766***	0.2113***
							(0.0338)	(0.0161)
Firm debt/assets							0.0127***	0.0155***
							(0.0023)	(0.0015)
Firm ROA							0.0533***	0.0394***
							(0.0075)	(0.0086)
Fixed effects								
Loan currency	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan purpose	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan type	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Country-Quarter	Yes	Yes	Yes	Yes	Yes	Yes		
Industry-Country-Size-Quarter							Yes	Yes
Regression setup								
Size-weighted	No	Yes	No	Yes	No	Yes	No	Yes
Fit statistics								
R^2	0.6970	0.8512	0.6970	0.8513	0.6969	0.8513	0.8578	0.9383
Observations	8,784	8,784	8,784	8,784	8,784	8,784	5,298	5,298

This table shows the results of the estimation of eq.(7). In columns (1), (3), (5) and (7), we repeat estimations from other tables in this paper which are estimated using WLS with weights inversely proportional to the number of leads. In columns (2), (4), (6) and (8), we present an alternative weighting scheme, which uses weights proportional to the size of the loan (as well as inversely proportional to the number of leads). The numbers in parentheses are standard errors, clustered at bank level. *, ** and *** indicate significance at 10%, 5% and 1% respectively.

7. Conclusion

The ECB dividend ban, announced in March 2020, was a major and unprecedented policy measure in the beginning of the Covid-19 pandemic. The most important goal of the dividend ban was to support the real economy, as retained dividends should incentivize banks to facilitate lending through higher capital buffers. However, prohibiting shareholder remuneration is expected to have adverse effects on banks' market valuations, as argued by Matyunina and Ongena (2022), which could make banks reluctant to use the additional capital buffer to increase lending. In this paper, we employ a multifaceted approach to analyze the consequences of the dividend ban for euro area banks.

In the first part, using an event study analysis, we find evidence of a negative stock market reaction of -5% to -7% on euro area banks, following the exogenous shock of the dividend ban announcement. Our findings are confirmed in multiple difference-in-differences analyses, in which we compare banks and non-bank financial corporations, as well as banks with and without expected dividend. Both the size of banks and their payout policy affects the extent of the valuation impact. We also find that the negative effect of the dividend ban announcement on the stock market valuation of affected banks (compared to banks without expected dividend) disappears in the medium-term.

Second, we examine the impact of the dividend ban on credit supply in the syndicated loan market. Our empirical analysis reveals that euro area banks which are affected by the dividend ban increase their supply of new syndicated loans. In the aggregate, we find that new syndicated loan amounts are 7% to 10% higher in the 9 months following the dividend ban announcement, which corresponds to an increase in syndicated lending by the affected euro area banks of 13bn to 16bn USD. We do not find evidence that the negative impact of the dividend ban announcement on banks' stock market performance has a counteracting effect on their credit supply. However, it is important to stress that we do not investigate potential long-run effects of the dividend ban on the stock market attractiveness of the banking sector as a whole, and how this might translate to their credit supply. As Andreeva et al. (2023) argue, subdued market valuations could adversely affect the capacity of banks to attract fresh capital, and as a result lower the supply of future lending.

In summary, we conclude that the dividend ban succeeded in providing support to the real economy, as intended by the supervisor. While the initial impact of the announcement on stock market valuations was clearly negative, this effect was rather transitory in the medium-term and did not impact banks' credit supply, suggesting that the negative side effects of the dividend ban were limited.

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