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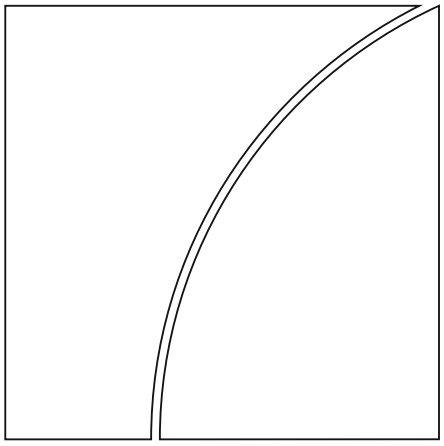

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by Leonardo Gambacorta, Tommaso Oliviero and Hyun Song Shin

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Low price-to-book ratios and bank dividend payout policies

Leonardo Gambacorta, Tommaso Oliviero and Hyun Song Shin*

Abstract

Banks with a low price-to-book ratio have a greater propensity to pay out dividends. This propensity is especially marked for banks with a price-to-book ratio below a threshold of 0.7. As a sector, banks also tend to have higher dividend payout ratios than non-financial firms. We demonstrate these features using data for 271 advanced economy banks in 30 jurisdictions. Dividend payouts as a proportion of profits rise in a non-linear way as the price-to-book ratio falls below 0.7. In a hypothetical exercise with fixed balance sheet ratios, we find that a complete suspension of bank dividends in 2020 during the Covid-19 pandemic would have added, under different stress scenario, an additional US$ 0.8–1.1 trillion of bank lending capacity in our sample, equivalent to 1.1–1.6% of total GDP.

JEL classification: G21, G35.

Keywords: dividend payout policy, banks, low interest rates, Covid-19 crisis.

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1. Introduction

The Covid-19 pandemic has renewed attention on the importance of a well-capitalised banking system that can support economic activity in the face of an unprecedented shock to the economy. Together with monetary and fiscal policy interventions, regulatory and supervisory actions have been aimed at mitigating the impact of the pandemic on bank lending capacity (Borio and Restoy, 2020).

To shore up banks' capital base, many regulators and banking federations have imposed or recommended that banks should suspend dividend distributions and share buybacks (Svoronos and Vrbaski, 2020).[1] This guidance may be particularly important in view of the incentives of banks' stakeholders and management.

When a bank's share price is substantially below the book value of equity, shareholders may feel they can unlock some value from their shareholding by paying themselves a cash dividend, even at the expense of eroding the bank's lending base. As many of the shareholders are asset managers who place weight on portfolio returns, the incentive toward dividends will be larger if the dividends boost short-term returns. The bank's management, for their part, may see the lower capital base as unobjectionable if it means that they can meet their return-on-equity target more easily by reducing the base for the return-on-equity calculation. Another source of incentives that bear on the distribution of dividends is the well-known signalling channel, whereby management intentionally signals future profitability even in the face of low earnings margins (Forti and Schiozer, 2015).

In this way, there may be a tension between the private motives of some bank stakeholders and the wider public policy imperative of maintaining credit in support of economic activity and building up greater solvency buffers. These private motives are understandable but, if the outcome is to erode capital that serves as the bank's foundation for lending to the real economy, then a gap may open up between the private interests of some bank stakeholders and the broader public policy imperative to preserve lending capacity and bank resilience for the benefit of the economy as a whole. To the extent that undercapitalised banks perpetuate a weak economy, thereby keeping bank stock prices under pressure, it may even be the case that paying out large dividends also fails to promote the collective interests of the bank's shareholders, let alone the wider public interest. The findings in Gambacorta and Shin (2018) suggest that higher levels of bank equity are more conducive to support lending by banks. In this respect, greater retention of bank earnings and hence higher levels of bank capital after the Great Financial Crisis of 2008–09 would have aided the transmission of accommodative monetary policy after the crisis.

The aim of this paper is to examine and document the characteristics of bank dividend payout decisions for a large group of advanced economy banks. Our sample

[1] As for the euro area, on 27 March 2020, the European Central Bank (ECB) adopted Recommendation ECB/2020/19, which proposed that, at least until 1 October 2020, no dividends can be paid out and no irrevocable commitment to pay out dividends can be undertaken by credit institutions for the financial years 2019 and 2020. Furthermore, on 27 May 2020, the ECB extended this recommendation until 1 January 2021 in line with Recommendation ESRB/2020/7 by the European Systemic Risk Board (ESRB), which invites relevant authorities to request financial institutions under their supervisory remit to refrain from making a dividend distribution, to buy back ordinary shares, or create an obligation to pay variable remuneration to material risk-takers.

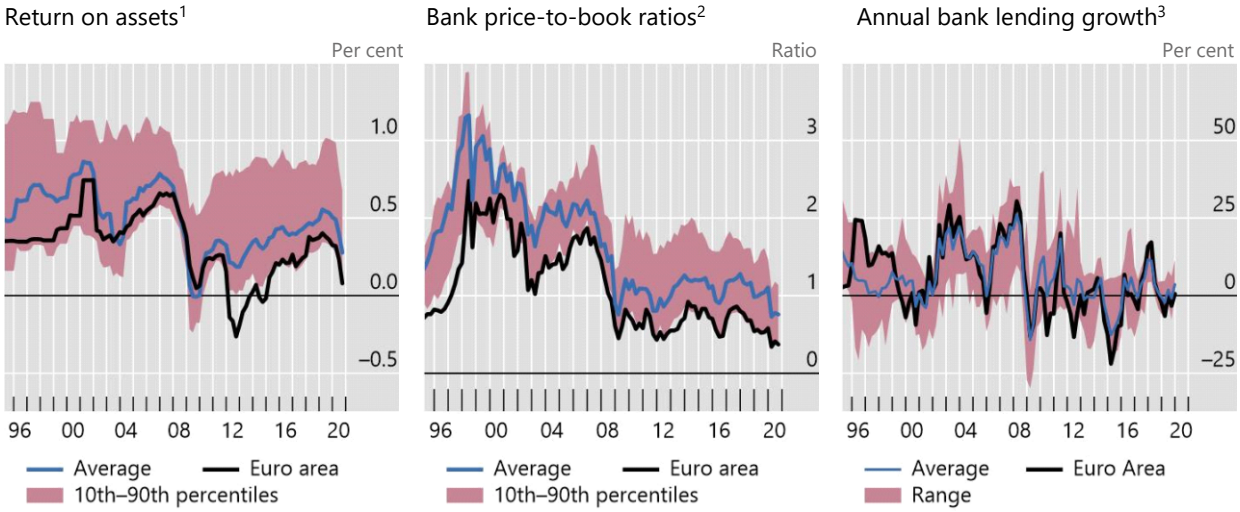
consists of 271 listed banks in 30 advanced economies. Following Fama and French (2001), we consider four main determinants that influence banks' dividend payout decisions: i) profitability, ii) total assets growth rate, iii) firm size and iv) the price-to-book ratio. Given the cross-country nature of our analysis, we also control for heterogeneity in macroeconomic conditions such as GDP growth in the country where the company operates, and country and time fixed effects.

We find that the propensity to pay dividends is positively correlated with short-run profitability and bank size, but not with annual changes in total assets.

Importantly, we find that banks have a higher propensity to pay dividends when the price-to-book ratio is low, and that this effect operates in a non-linear fashion. In particular, the incentive to pay dividends is particularly strong when the price-to-book ratio is below a threshold significantly below one. Our findings are of particular relevance for those economies whose banks have price-to-book ratios that are substantially below 1. The euro area is one such example. Indeed, recent studies find that a protracted low interest rate environment tends to erode bank profitability over the longer term (Claessens et al, 2018; Borio et al, 2017; Rostagno et al, 2019). European banks in particular have seen a large impact on their profitability as measured by the return on assets (ROA) (Graph 1, left-hand panel; see Brei et al, 2019).

Low profitability and price-to-book ratios hinder banks' willingness to lend

Graph 1



[1] Asset-weighted average of AU, CA, DK, EA, GB, JP, NO, SE and US. [2] Asset-weighted average of AU, CA, CH, EA, GB, JP, SE and US. [3] Bank credit to the private non-financial sector. Simple average of AU, CA, CH, EA, DK, GB, JP, NO, SE and US.

Sources: Datastream; Datastream Worldscope; national data; authors' calculations.

The expectation of low future profitability could reduce market valuations of bank equity relative to the respective book value (price-to-book ratio; Graph 1; centre panel). For large international banks headquartered in advanced economies, price-to-book ratios dropped significantly in the aftermath of the Great Financial Crisis and are below 1 for more than half of banks in more recent years. This gives banks a strong incentive to distribute dividends, even if this erodes their lending capacity and

bank resilience. Perhaps as a result, credit to the private sector has grown at a slow pace in the last years, especially in the euro area (Graph 1, right-hand panel). [2]

The suspension of dividend distributions and share buybacks may indeed, by increasing banks' capital, help cushion the impact on lending in the short run or improve bank lending capacity in the future (Drehmann et al, 2020). In the last section of the paper, we show that, if banks had not distributed dividends but had accumulated them in their capital base, the potential effects on lending would have been substantial. Abstracting from loan demand, in the aftermath of the Great Financial Crisis, bank lending capacity would have been between 2% and 16% greater, depending on the predictive model used. Overall, under different adverse scenarios, between US$ 7–10 trillion could have been supplied as additional loans in the current pandemic. This corresponds to roughly 11–15% of the GDP of the 30 advanced economies considered in this study.

Restrictions on dividend distribution during the recent Covid-19 crisis may have a significant impact on lending supply capacity of the banking sector. We evaluate the impact on bank lending by assuming a suspension of the dividend distribution of bank profits generated in 2019. Results show that the retention of USD 100 billion of net income in 2020 implies that the potential growth rate of bank lending would be around 0.8 percentage points higher, keeping other balance sheet ratios fixed. However, one caveat from this analysis is that the pandemic crisis has altered the risk weights of assets. Considering alternative scenarios, we show that additional lending capacity would be in the range of US$ 0.8–1.1 trillion, corresponding to 1.0–1.4% of average domestic credit to the private sector in our sample.

The remainder of the paper is structured as follows. Section 2 defines the theoretical set-up. Section 3 introduces the data used for the analysis and provides an initial descriptive analysis. Section 4 describes the empirical model and reports the results. Section 5 presents a counterfactual experiment to evaluate the impact on bank lending under the hypothesis that dividend would not have been distributed. The last section summarises the main conclusions.

2. Theoretical considerations

According to the Modigliani-Miller theorem, in complete market settings, shareholders are indifferent to whether they receive dividends or retain profits inside the company. This general principle applies to all firms, both financial and non-financial.

Away from the theoretical benchmark of frictionless economies, the choice of distributing dividends versus retaining profits will be affected by the underlying micro motives of banks' stakeholders and management.[3] For example, as mentioned above, paying dividends can help firms to signal future profitability. At the same time, retained earnings are by far the primary way of enlarging the equity base to support

[2] Munoz (2020) shows that, when shocks hit their profits, banks tend to adjust retained earnings to smooth dividends. This generates volatility in bank equity and credit supply. Using a DSGE model that incorporates such a mechanism, the author studies the transmission and the effects of a novel macroprudential policy rule that imposes limits on bank dividend distribution over the cycle.

[3] See Allen and Michaely (2003) and De Angelo et al (2009) for a comprehensive review of the literature.

the firm's business needs and insulate firms from exogenous shocks (BCBS, 2020). Equity is especially important for banks, as it forms the basis for lending activity (Berrospide and Edge, 2010; Clerc et al, 2015); Meh and Moran, 2013; Gambacorta and Shin, 2018).

The signalling effect is relevant for banks as their assets (e.g., loans) are more opaque to external investors than those of many other firms. At the same time, capital is essential not only to protect depositors but also to smooth bank lending activity. More equity is associated with lower debt funding costs and a higher growth rate in lending. As shown by Miles et al (2013) and Gambacorta and Shin (2018), this can ultimately benefit the transmission of monetary policy.

Following Fama and French (2001), we consider four main determinants that influence dividend payments decisions.

Bank profitability. The first determinant is a firm's profitability. Good business conditions lead to an increase in dividend payments to compensate shareholders for taking risk. In our analysis, we measure profitability by the firms' net earnings per unit of book value of equity (return on equity, or ROE).[4]

Investment opportunities. Investment opportunities are proxied by the annual growth rate of total assets. As argued by Fama and French (2001), both short-term assets (ie, cash committed for future investments) and capital expenditures must be considered as a form of investment from the company's perspective. This is true also for financial companies. Consequently, we proxy this determinant with the annual growth rate of total assets (GTA).

Size. The third determinant is the company's size ($SIZE$). Larger and more mature firms typically have more stable profits and, as a consequence, can guarantee stable payout policies. In line with previous studies, we argue that firms with a higher market capitalisation show a greater propensity to pay dividends and repurchase shares.

Price-to-book ratio. The fourth determinant is the price-to-book ratio (PBR). For shareholders who are motivated by short-term considerations, cash dividends will be superior to retained earnings that are valued at the (lower) market price of shares. In line with the other proxy for investment opportunities, larger price-to-book ratios are associated with growing firms with a lower propensity to distribute dividends. Furthermore, the lower is the market value of a firm compared to its book equity, the more attractive dividend distribution becomes; indeed, dividends serve as a signal that the firm is undervalued (Stein, 2003). In this respect, a lower price-to-book ratio increases the pressure on the management to compensate shareholders.

We can illustrate the determinants of dividends with the notation below:

$$D = D\begin{pmatrix} ROE & GTA & SIZE & PBR \\ + & - & + & - \end{pmatrix}, \qquad (1)$$

where D denotes the binary outcome of whether dividend payment occurs or not as a function of the four highlighted factors above. For each determinant we indicate the expected sign of its relationship with dividend payouts according to the theory.

[4] We use ROE – rather than return on assets (ROA) – as it better captures the return from equity holders' perspective. If profits rise and the business outlook is positive, it becomes also more attractive for the management to invest in its own firm by means of share buybacks (Miller and Rock, 1985). All empirical results are confirmed using ROA rather than ROE in the regression analyses (results available upon request).

Given the cross-country nature of our analysis, we also control for heterogeneity in macroeconomic conditions measured by the GDP growth of the country where the bank is headquartered and operates. If the economy as a whole is in an expansionary phase, the shareholders' opportunity costs for alternative forms of investment increase and their expectations of an increase in dividend payments rise. More specifically for banks, macroeconomic growth increases the value of bank lending, impacting on banking sector profitability and stability and, ultimately, the dividend distribution prospects. Finally, our specification includes country fixed effects that allow country-time invariant characteristics such as the dividend taxation regime to be controlled for.

Our main empirical results highlight the non-linear impact of the price-to-book ratio on the incentive to pay dividends. In particular, the propensity to pay dividends is larger, the lower is the price-to-book ratio.

To introduce the main ideas, consider the short-term stock return r_t, consisting of the stock price next period (p_{t+1}) plus dividends distributed at time t (d_t) normalised by the stock price at time t:

$$r_t = \frac{p_{t+1} + d_t}{p_t}. \quad (2)$$

We define M_t as the market capitalisation at date t, E_t as the book equity at date t, and $D_t = d_t * N$ as total dividend (dividend per share multiplied by number of shares N). For now, we suppose that that the price-to-book ratio $\rho = M_t/E_t$ is a constant. We can re-write the expression for short-term stock return in (2) as:

$$r_t = \frac{\rho\, E_{t+1} + D_t}{\rho\, E_t}. \quad (3)$$

Assuming that total equity at time t+1 is equal to the sum of equity in the previous period, plus profits generated net of distributed dividends ($E_{t+1} = E_t + \pi_t - D_t$) and re-arranging, we get:

$$r_t = \frac{E_t + \pi_t}{E_t} + \left(\frac{1-\rho}{\rho}\right)\frac{D_t}{E_t}. \quad (4)$$

Equation (4) states that the short-term return to a shareholder is the sum of two terms: i) the return on the book value of equity when all profits are retained, and ii) the dividends normalised by book equity multiplied by the coefficient ($\frac{1-\rho}{\rho}$).

This coefficient can be either positive ($\rho < 1$) or negative ($\rho > 1$). In particular, note that when $\rho = 1$, the short-term return is invariant to the dividend, as one euro inside the bank is worth the same as one euro outside the bank paid as a dividend.

Equation (4) suggests that the incentives of the firm's shareholders to pay out dividends are present when the ρ is below one, and that the marginal impact of the dividend on the short-term return is higher for lower values of the ρ. Indeed, we show in our empirical analysis that this non-linear nature of the incentive to pay dividends is in operation in a strong way.

In the discussion above, we have worked with the assumption that the price-to-book ratio is a constant. In general, this depends on the book equity of the bank. Therefore, equation (4) should be seen as a first-order approximation applicable for a marginal change in the dividend. In the empirical part, we provide sensitivity analysis

in the cross-section of banks, whereby values of ρ below 1 strengthen the greater impact of a fall in the price-to-book ratio on the propensity to pay out dividends.

3. Data and stylised facts

In their seminal study on the determinants of dividend payout policy, Fama and French (2001) focus their analysis on non-financial firms. They exclude financial firms as "different", because they are subject to stricter regulatory constraints, operate with high leverage and tend to have a specific investment activity. However, an initial empirical question to address is if financial firms are really different from non-financial ones in their propensity to pay dividends once its determinants are controlled for.

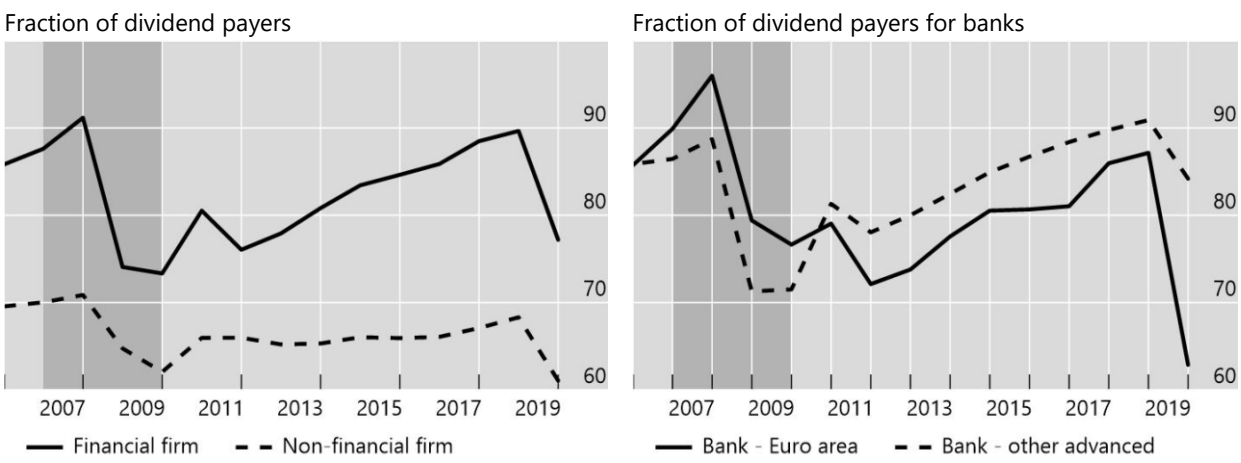
Graph 2 shows the dividend payment policies of financial firms (banks and insurance companies) and non-financial firms over the period 2005–19. Data are taken from S&P Capital IQ database. The left-hand panel of Graph 2 plots the fraction of dividend payers for 3,638 listed firms headquartered in 35 advanced countries. The average fraction of financial firms that paid dividends is significantly larger than the corresponding fraction of dividend payers in non-financial firms (82.5% vs 66.1% in the period 2005–19); this is also true in the years around the Great Financial Crisis (2008–09).

The pattern is even stronger when, within the group of financial firms, we exclude insurance companies and focus on banks (Graph 2, right-hand panel); the pattern is furthermore similar for both banks in the euro area and banks from other advanced

Dividend payouts: are financial firms different?

In per cent

Graph 2



The shaded areas indicate recession periods (2007–09).

[1] The analysis uses an unbalanced panel of 3,638 listed firms from 35 countries over 2005–19. Data for 2019 are partial as balance sheet items are not reported for a few firms. Firms have headquarters in advanced economies (European Union, Australia, Canada, China, Chinese Taipei, Hong Kong SAR, Iceland, Israel, Japan, Korea, New Zealand, Norway, Singapore, Switzerland, United Kingdom, United States). Companies span different industries, with 363 companies (about 10% of the sample) classified as financial firms (banks and insurance companies). [2] The sample includes 271 banks headquartered in 30 countries (excluded countries: Luxembourg, Slovakia, Estonia, Latvia, Slovenia), 93 of which are headquartered in the euro area.

Sources: S&P Capital IQ; authors' calculations.

economies. Notice that, as for the profit generated in 2019, we observe a sharp drop in the fraction of dividend payers, especially among banks headquartered in the euro area; for this group of banks, as the right-hand panel of Graph 2 shows, the fraction of payers has fallen from 84.1% for profits generated in 2018 to 62.8% for those generated in 2019. Notice that decision to distribute dividends was made in the first part of 2020 during the Covid-19 crisis in Europe and the observed drop in the fraction of dividend payers partly reflects the adherence of financial institutions to the recommendations of regulators and supervisors on the suspension of dividend distributions and share repurchases.

The sample of banks used in this study comprises an unbalanced panel of 271 financial institutions headquartered in 30 advanced economies over the period 2005–19. The group of countries includes those that belong to the European Union plus Australia, Canada, Chinese Taipei, Hong Kong SAR, Iceland, Israel, Japan, New Zealand, Norway, Singapore, South Korea, Switzerland, the United Kingdom and the United States.

In the empirical section below, we will see that the difference in the average fraction of dividend payers between financial and non-financial firms is still positive and significant once dividend payout determinants are controlled for. We also find that, on average, among dividend payers, banks reported a dividend yield that is about 57 basis points higher than the average yield of non-financial firms.

This analysis so far documents that financial firms have a larger propensity to distribute dividends than do non-financial firms. This justifies the approach taken by the literature to treat financial companies differently and separate them from firms operating in other sectors. Indeed, the theoretical literature provides different insights on the special characteristics of banks that may ultimately affect their dividend payout policies and differentiate them from those of other non-financial firms. In particular, the main arguments refer to the opacity of banks' activities, their specific financial structure and the presence of strict regulatory constraints.

The first motivation is the opacity of banks' activities. Morgan (2002) highlights that stakeholders outside the banks (e.g., rating agencies) are usually uncertain about the risks associated with loans or banks' trading assets. This uncertainty is further compounded by banks' high leverage and can potentially increase the agency conflict between insiders and outsiders. In this respect, dividend policies may be used by managers as a signal for reducing the information asymmetry with respect to outsiders, especially in times where the company is undervalued by the market (Calomiris and Nissim, 2014). At the same time, banks' shareholders may have a preference for large and stable cash dividends in order to discipline managers and reduce their incentives to extract private benefits; for these reasons financial firms are more likely to be dividend payers, in line with the prediction of the catering theory of dividends (Baker and Wurgler, 2004a, 2004b; Li and Lie, 2006). Indeed, as shown by Bessler and Nohel (1996), negative stock-market reactions to dividend cuts are larger for banks than for non-financial firms.

Furthermore, in contrast to non-financial companies, banks have heterogeneous sources of funding that can come from both retail depositors and wholesale markets. In particular, retail depositors may have little incentive to monitor managers because they are covered by deposit insurance schemes or implicit guarantees such as bail-out packages (Demirgüç-Kunt and Huizinga, 2004). This reduces the cost of debt relative to the cost of equity for banks, increasing the opportunity cost of retaining earnings inside the company, and thus providing an incentive to distribute dividends

in the short run. Indeed, as argued by Adrian et al. (2015), in the run-up to the Great Financial Crisis, banks choose to finance credit growth by taking on more debt, even while they eroded their book equity through dividend payouts.

Finally, regulatory constraints may influence decisions on dividend payments. Undercapitalised banks may be incentivised to retain earnings inside the company, as reducing dividends could be less costly than issuing capital. Abreu and Gulamhussen (2013) find evidence in favour of this hypothesis for US banks in the context of the Great Financial Crisis. On the other hand, agency conflicts with shareholders and depositors might matter less in countries where supervisors are more rigorous in their approach to assessing and verifying banks' risks, as well as in the presence of tighter restrictions on banks' activities. In this environment, the signalling role of dividends could be less strong, and the choice of distributing earnings more purely related to banks' investment opportunities, especially for well-capitalised banks.

Given the special characteristics of banks that may ultimately affect their dividend payout policies, and the consequent difficulty of unequivocally differentiating between financial and non-financial firms, later on in the paper we will focus our empirical investigation exclusively on banks. In detail, the focus of our analysis is on banks headquartered in advanced economies.

Table 1 Summary statistics. Euro area vs other advanced economy banks

	All banks		Euro area		Other advanced economies	
	Non-payer	Payer	Non-payer	Payer	Non-payer	Payer
	(I)	(II)	(III)	(IV)	(V)	(VI)
Dividend payments/Market capitalisation	0	0.028	0	0.027	0	0.029
	(0)	(0.029)	(0)	(0.023)	(0)	(0.023)
Dividend payments/Book value of Equity	0	0.035	0	0.035	0	0.036
	(0)	(0.043)	(0)	(0.045)	(0)	(0.041)
Return on equity	-2.025	10.42	-3.369	9.280	-1.165	11.00
	(21.07)	(8.420)	(20.66)	(8.402)	(21.30)	(8.372)
Log(Market Capitalisation)	6.060	7.936	6.416	7.584	5.831	8.115
	(2.769)	(2.266)	(2.785)	(1.979)	(2.738)	(2.378)
Price-to-book ratio	0.821	1.298	0.739	1.172	0.873	1.361
	(0.645)	(1.258)	(0.659)	(1.153)	(0.631)	(1.303)
Growth rate of total assets	0.851	6.048	-1.849	4.798	2.578	6.681
	(20.83)	(16.70)	(18.03)	(17.51)	(22.29)	(16.25)
GDP growth	1.606	1.961	0.952	1.326	2.025	2.283
	(2.762)	(2.104)	(3.179)	(2.242)	(2.369)	(1.953)
N (in %)	19.1	81.9	21.3	79.7	16.8	83.2
Observations	3,459		1,196		2,263	

Notes: The table reports average values (standard errors in brackets) for the sample of 271 banks observed in the period 2005–19.

Table 1 provides summary statistics of the variables that are expected to be key determinants of the propensity to pay dividends. In each year, we split banks between payers (distribute dividends) and non-payers (not distributing dividends). In the first two columns we report the entire sample, while in columns (III) and (IV) we report summary statistics of banks headquartered in the euro area and in columns (V) and (VI) for banks operating in the other advanced economies.

In line with the theoretical predictions, we find that payers have higher profitability, as measured by their ROE, and are larger, as measured by the logarithm of market capitalisation. Banks that distribute dividends have also a growth rate of total assets that is roughly 5 percentage points higher than those of banks that did not pay. This suggests that, contrary to classical corporate theory, the relationship between total assets growth rate and the probability of distributing dividends is positive for banks; this evidence is in line with the idea that banks do not finance new investment opportunities with liquid resources generated inside the company (i.e., cash flows) but prefer to finance them with less costly external funding (i.e., deposits). Non-payers have a lower price-to-book ratio than payers. As we will show below, in line with theory, this relationship turns to be negative after conditioning on other dividend payout determinants. Interestingly, we will also show that there is a large and significant non-linearity between the choice of distributing dividends and price-to-book ratios for banks.

Looking at differences across jurisdictions, euro area banks display lower profitability both among payer and non-payer banks and display lower average growth rates for total assets. However, the differences in the dividend payout factors between payer and non-payer banks are qualitatively similar between euro area banks and banks headquartered in other advanced economies.

4. Empirical analysis

In this section, we model the probability that a firm pays out dividends. In particular, we use a linear probability model, conditioning on the effects of profitability, size and investment opportunities:

$$D_{itc} = \alpha + \beta FinFirm + \gamma X_{it} + \delta GDP_{ct} + \lambda_t + \tau_c + \varepsilon_{itc} \quad (5)$$

where D_{it} is equal to 1 if firm i at time t pays dividends and 0 otherwise. $FinFirm$ is a dummy variable that takes value equal to 1 if a company operates in the financial sector (banks plus insurance companies) and zero otherwise. The vector X_{it} includes the four time-varying determinants of the likelihood of paying dividends as outlined in the previous section: 1) the return on equity, 2) the growth rate of total assets; 3) the log of market capitalisation, and 4) the price-to-book ratio. Changes in the macroeconomic environment are captured by the inclusion of GDP_{ct}, the annual growth rate of real GDP in country c. The model also includes year fixed effects (λ_t) to control for global time-varying factors and country fixed effects (τ_c) that control for institutional characteristics such as dividend taxation.[5]

[5] In the period under scrutiny and for the set of countries that we analyse, we do not detect significant changes in taxation of dividends.

We show the estimates in Table 2, columns (I) to (III) starting from a very simple model that includes only the financial firm dummy $FinFirm$ and the time fixed effect to the complete equation (5). In column (I) the estimate of the coefficient β is positive and statistically significant; the corresponding marginal effect tells that, once conditioning on time fixed effects, financial firms have a probability of paying dividends that is about 16.3 percentage points larger than that of other companies. This confirms the graphical analysis in the left-hand panel of Graph 2. The estimated β coefficients in columns (II) to (III) – for more complete models – are still positive and statistically different from zero, once conditioning on X_{it} variables and country-level controls. The estimates suggest that, after conditioning on ROE, growth opportunities, as proxied by both the price-to-book ratio and the annual growth rate of total assets, the log of the market capitalisation, annual changes in GDP and country fixed effects, the propensity of financial companies to pay dividends is about 5 percentage points larger than other companies.

Table 2. Dividend payout probability. Financial vs non-financial firms

	(I)	(II)	(III)	(IV)	(V)	(VI)
	Dividend payout (0/1)					
	All financial firms: insurance companies and banks (all world)			Banks (all world)		
FinFirm	0.163***	0.048***	0.049***			
	(0.006)	(0.006)	(0.005)			
Bank				0.157***	0.056***	0.055***
				(0.007)	(0.006)	(0.006)
Return on equity		0.008***	0.008***		0.008***	0.008***
		(0.000)	(0.000)		(0.000)	(0.000)
Log(Market Capitalisation)		0.068***	0.072***		0.067***	0.072***
		(0.001)	(0.001)		(0.001)	(0.001)
Price-to-book ratio		-0.020***	-0.020***		-0.020***	-0.020***
		(0.001)	(0.001)		(0.001)	(0.001)
Growth rate of total assets		-0.001***	-0.001***		-0.001***	-0.001***
		(0.000)	(0.000)		(0.000)	(0.000)
Observations	44,841	44,841	44,841	43,599	43,599	43,599
R-squared	0.015	0.325	0.351	0.012	0.324	0.349
Year FE	Y	Y	Y	Y	Y	Y
Country FE and GDP growth	N	N	Y	N	N	Y

Notes: OLS estimation with robust standard errors in brackets. Significance level: *p<0.1; ** p<0.05; *** p<0.01. *Financial Firm* is a dummy variable that takes value equal to 1 if a company operates in the financial sector (banks plus insurance) and zero otherwise. *Bank* is a dummy variable that takes value equal to 1 for banks and zero otherwise.

In columns (IV) to (VI), we repeat the analysis by excluding insurance companies from the sample. The β estimates show that, once conditioning on controls, the probability that banks will pay dividends is significantly larger than that of other companies.[6] In the more complete model reported in column (VI) of Table 2, the

[6] Baseline results in Table 2 to 4 are confirmed when using as dependent variable an indicator variable for the occurrence of either dividend payout or share repurchases or both (results are available upon request). Notice that share repurchases account, on average, for a smaller amount relative to dividends and the annual change of retained earnings, as Figure A1 in the Annex shows.

probability of paying dividends for banks is 5.5 percentage points larger than that of non-financial firms.

Following Fama and French (2001), and in light of the discussion in Section 2, we consider banks to be different from other companies and focus the subsequent empirical analysis exclusively on this group of firms. Specifically, we analyse banks headquartered in 30 advanced countries in the period 2005–19; we focus on banks in more developed countries with a view to evaluating companies operating in jurisdictions with more homogenous institutional characteristics and macroeconomic trends. As a first step, we estimate the following linear probability model:

$$D_{itc} = \alpha + \gamma X_{it} + \delta GDP_{ct} + \lambda_t + \tau_c + \varepsilon_{itc} \ . \quad (6)$$

Results are reported in Table 3. The results show that, in line with corporate finance theory, profitability and size are positively correlated with the dividend payout propensity for banks too. By contrast, we do not find that the total assets growth rate has a significant impact on dividend payout policies for banks. This result is in line with Adrian et al. (2015), who find that financial firms prefer to finance asset growth through debt. This makes payout policies insensitive to asset growth, given that banks do not need to finance investment opportunities with internally generated financial resources. Finally, conditioning on other variables, banks display a negative relationship between their price-to-book ratio and dividend payout propensity, in line with the theory.

Table 3. Dividend payout probability and Fama-French drivers: banks

	(I)	(II)	(III)
	Dividend payout (0/1)		
	Banks (advanced economies)		
Return on equity	0.0102***	0.0100***	0.0094***
	(0.0007)	(0.0007)	(0.0007)
Log(Market Capitalisation)	0.0332***	0.0331***	0.0196***
	(0.0028)	(0.0028)	(0.0036)
Price-to-book ratio	-0.0102**	-0.0117***	-0.0138***
	(0.0046)	(0.0045)	(0.0047)
Growth rate of total assets	-0.0000	-0.0001	-0.0002
	(0.0004)	(0.0004)	(0.0004)
Observations	3,459	3,459	3,459
R-squared	0.185	0.1952	0.321
Year FE	N	Y	Y
Country FE and GDP growth	N	N	Y

Notes: OLS estimation with robust standard errors in brackets. Significance level: *p<0.1; ** p<0.05; *** p<0.01.

Interestingly, the estimated coefficient for the price-to-book ratio in Table 3 is about half the coefficient for the entire sample reported in Table 2.[7] As the price-to-

[7] We also checked this result in a more general model estimated for all firms. This model also includes interaction terms between each explanatory variable and a dummy variable that takes the value of 1

book ratio represents an indicator of shareholders' incentive to reinvest profits in the firm, this could be low in case of depressed market valuations. Accordingly, the low value of the coefficient could hide some form of non-linearity in the relationship between dividend payouts and price-to-book ratio (*PBR*). In the following steps, we will estimate a model specification that allows us to evaluate how different realisations of banks' *PBR* potentially affect the dividend policies of banks. In particular, we split the banks into three groups based on the distribution of the price-to-book ratio (we split the sample based on the three *PBR* terciles).

In detail, we estimate the following linear probability model:

$$D_{it} = \alpha + \beta PBR(dummy) * PBR + \gamma X_{it} + \delta GDP_{ct} + \lambda_t + \tau_c + \varepsilon_{it} \qquad (7)$$

where, differently from equation (6), the price-to-book ratio is additionally interacted with two dummy variables that take a value equal to one if the *PBR* is below the first tercile of the *PBR* distribution (*PBR* low), or above the second tercile of the *PBR* distribution (*PBR* high). The interaction with the second decile of the *PBR* distribution (*PBR* medium) is subdued by the presence of the *PBR* in the specification. The aim of this specification is to test for a non-linear relation between the dividend payout propensity and the *PBR*. Results are displayed in Table 4.

Table 4. Dividend payout probability and price-to-book ratio in banks

	(I)	(II)	(III)
		Dividend payout (0/1)	
		Banks (advanced economies)	
Return on equity	0.0102***	0.0100***	0.0093***
	(0.0007)	(0.0007)	(0.0007)
Log(Market Capitalisation)	0.0318***	0.0317***	0.0185***
	(0.0028)	(0.0028)	(0.0036)
Price-to-book ratio (*PBR*)	-0.0505***	-0.0517***	-0.0310*
	(0.0176)	(0.0178)	(0.0178)
Growth rate of total assets	-0.0001	-0.0002	-0.0002
	(0.0004)	(0.0004)	(0.0004)
PBR x *PBR*(low)	-0.1117***	-0.1044***	-0.1107***
	(0.0313)	(0.0313)	(0.0309)
PBR x *PBR*(high)	0.0288*	0.0296*	0.0100
	(0.0155)	(0.0157)	(0.0155)
Observations	3,459	3,459	3,459
R-squared	0.189	0.1986	0.324
Year FE	N	Y	Y
Country FE and GDP growth	N	N	Y

Notes: OLS estimation with robust standard errors in brackets. Significance level: *p<0.1; ** p<0.05; *** p<0.01. *PBR*(Low) identifies banks with a price-to-book ratio (*PBR*) below the first tercile of the *PBR* distribution (*PBR*≤ 0.67). *PBR*(High) identifies financial institutions with *PBR* above the second tercile of the *PBR* distribution (*PBR* > 1.22).

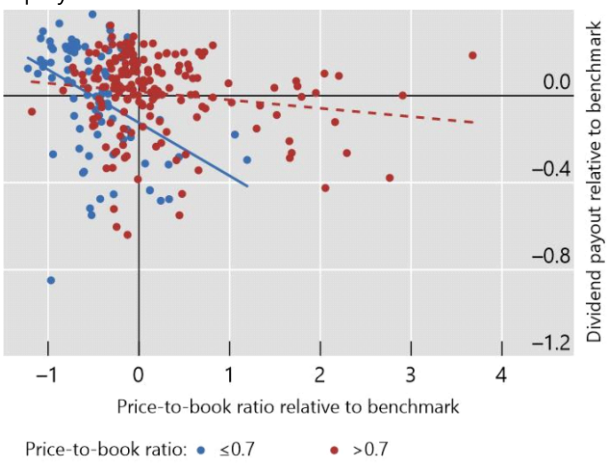
when the firm is a bank and 0 elsewhere. In this model, the different sensitivity of the dividend payout for banks can be verified directly on the statistical significance of the interaction term. The coefficient on the interaction term with respect to the price-to-book ratio is equal to 0.0164 with a standard error of 0.005.

The table presents three specifications that progressively include additional controls. The specification in the first column excludes time and country fixed effects and macro controls. In the second column, we include time dummies, while the third column reports the complete specification. Coefficients remain quite stable across specifications. Results show that, after controlling for other bank-specific characteristics (ROE, size, asset growth) and macroeconomic controls, the negative correlation between the dividend payout dummy (0/1) and the price-to-book ratio is particularly strong (–0.138***) for banks in the first tercile of the *PBR* distribution. For banks, between the first and second tercile, the impact of *PBR* on dividend payout probability is instead weaker (–0.03*) and becomes even lower for banks in the third decile of the decile of the distribution (–0.02*).

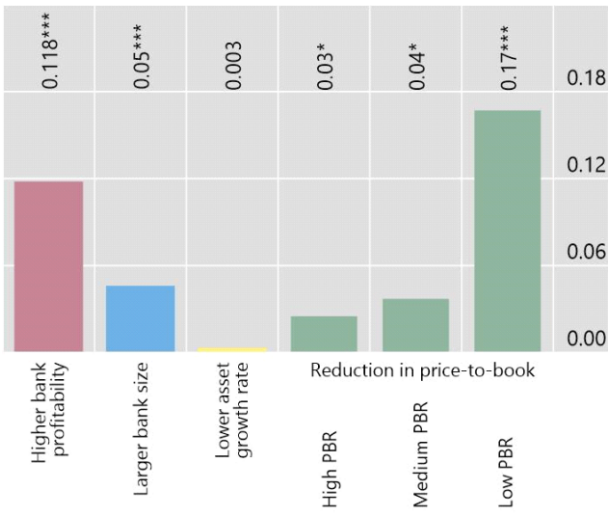
These results are also represented graphically in the left-hand panel of Graph 3, which reports the probability of a dividend distribution on the vertical axis and the price-to-book ratio on the horizontal axis, controlling for other bank-specific characteristics (ROE, size, asset growth) and macroeconomic conditions. The negative correlation between the dividend payout dummy (0/1) and the price-to-book ratio is particularly strong for banks in the first tercile of the *PBR* distribution, represented in the graph with blue dots. For other banks, represented by red dots (second and third tercile), the correlation is much lower.

Determinants of bank dividend payout policies — Graph 3

Low price-to-book ratio creates incentive to pay out equity[1]



Effect on the probability of distributing dividends[2]



[1] The graph shows the link between the probability of dividend distribution (vertical axis) and price-to-book ratio, controlling for other bank-specific characteristics (ROE, size, asset growth) and macroeconomic conditions (horizontal axis). The blue dots are for banks with price-to-book ratios in the first quartile (below 0.7). [2] The bars visualise the average estimated change in the probability of distributing dividends from a one standard deviation shock in the respective variables. ***/**/* denotes results significant at the 1/5/10% level.

Source: Authors' calculations.

4.1 Robustness checks

The choice of dividing the sample of banks in three groups may sound somewhat arbitrary. The reason we use terciles is that we want to establish the non-linear impact of *PBR* when it reaches a value significantly below one while, at the same time,

keeping the number of sub-groups relatively large and constant. However, in order to verify the stability of these results, we have performed a series of robustness checks. First, we have estimated a regression model as in equation (7) but distinguishing the sample of banks in two groups modifying progressively the value of the threshold for PBR. In other words, we construct different PBR(low) dummies that identify banks below a certain threshold of PBR. We use different thresholds that goes from PBR below one to PBR below 0.5. Results, displayed in Table A1 in the Annex, show that the non-linear effect of PBR emerges for values below 0.8. As expected, the coefficients on the interaction term are larger (in absolute value), the lower the threshold. This confirms that the non-linearity emerges for values of the PBR significantly below one, and it induces a larger propensity to payout dividends, the lower its value. As a second robustness check, we have divided the sample of banks in quartiles of the PBR distribution and estimated a version of equation (7) that includes three interaction variables. Estimates in Table A2 in the Annex, confirm the non-linearity impact of PBR which is more pronounced for the group of banks belonging to the first quartile of the distribution ($PBR \leq 0.58$). [8]

Furthermore, in our analysis, we have followed Fama and French (2001) and focused on linear probability models that capture a bank's decision to distribute dividends or not. Another approach could be to use as dependent variable the ratio of dividend payments rather than an indicator variable. Dividend payments can be computed as dividend over book equity or as dividend over market capitalization. In both cases, unfortunately, the dependent variable is mechanically correlated with the price-to-book ratio (market capitalization over book equity) so the correlation between these two expressions for the dividend ratio and the PBR gives limited insights. However, some insights could be derived by the different intensity in the correlation across different groups of banks with a diverse level of PBR. Results from Tobit estimation (needed for the presence of a truncated variable such as the dividend ratio) are reported in Tables A3 and A4 in the Annex. The results confirm that not only the propensity, but also the level of dividend distributed, are a non-linear function of PBR and the propensity to distribute dividends is larger for values of the PBR significantly below one.

Finally, more recent analyses have extended the Fama and French (2001) theory of dividends payout propensity, highlighting the explanatory role of other firm-specific characteristics. For instance, DeAngelo et al (2006) show that more mature firms pay more dividends to resolve agency conflicts over cash flow; the study uses the ratio of earned capital to total equity as a measure of firm's life-cycle stage. Inspired by this study, we verify the robustness of our results by including the ratio between retained earnings and total equity as additional regressor in the equation (7). In line with the theoretical predictions, estimates in Table A5 in the Annex display a positive relation between the retained earnings over total equity ratio and the dividend payout propensity also in our sample of banks. Importantly, our main coefficients of interest remain unchanged.[9] More recently, Kuo et al (2013) have analyzed the role of capital ratios and liquidity for the dividend payout propensity of firms by analyzing a sample of companies from 18 countries. Following this study, we

[8] The results are robust to the inclusion in the regression models (3) and (4) of interacted country-year fixed effects, which allow to control for unobserved variation occurring at country level over the years (results available upon request).

[9] It is worth noticing that the number of observations has dropped because of missing data for the variable retained earnings over total equity.

add to the regression model in equation (7) the ratio of debt over equity as additional control for leverage. Results in Table A6 in the Annex show a negative relation between debt over equity and the propensity to payout dividends; this is in line with the theory as dividend distribution may erode the capital base of banks. Also in this case, the coefficient estimates that identify the non-linear relation between PBR and dividend propensity payout remain very similar.

5. Impact on bank lending capacity

So far, we have documented that, *ceteris paribus*, dividend distributions occur more often in banks than non-financial firms, and banks' payout policies tend to be more generous when they have a lower market valuation. However, dividend distribution reduces the bank capital base. As discussed above, the accumulation of capital is important not only to protect depositors but also to sustain lending activity. A larger equity base is associated with lower debt funding costs and a higher supply of bank lending, thus having important macroeconomic consequences. Furthermore, an excessive dividend distribution could affect the smooth transmission of monetary policy.

In this section, we provide an assessment of the impact on bank lending capacity in the hypothetical case where the banks in our sample were not to distribute dividends for profits obtained in the period 2007–19 but retained them in their capital base. In this extreme hypothesis, we show that the macroeconomic effects on lending would have been potentially sizeable. In this simulation we abstract from loan demand, so our estimates cannot be interpreted as the equilibrium impact of dividends on aggregate lending.

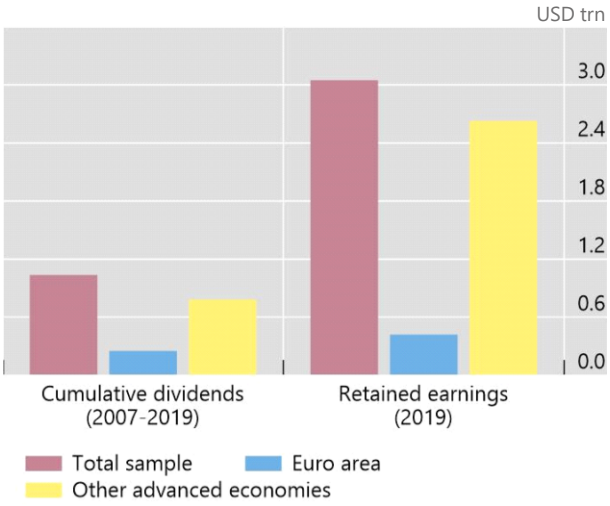
Also notice that in the following simulation we assume that the choice of not distributing dividends does not impact on stock prices and, ultimately, on the ability of banks to raise external equity financing. To the extent that the impact of dividend suspension on stock prices is negative, our estimates can be interpreted as an upper bound of the effects on bank lending. However, the cost of market financing for well-capitalised banks tends to be lower, and therefore the overall effect of dividend suspension on the cost of capital is uncertain *a priori*.

The left-hand panel of Graph 4 shows the cumulative dividend payments and retained earnings for our 271 banks operating in 30 different advanced economies, including the main global systemically important banks (G-SIBs). By the end of 2019, total retained earnings stood at $3.05 trillion and cumulative dividends since 2007 amounted to $1.04 trillion – around one third of retained earnings. The panel shows that the ratio of cumulated dividends to retained earnings is particularly large for banks in the euro area, reaching 60% over 2007–19, against about 30% for banks in other advanced economies.

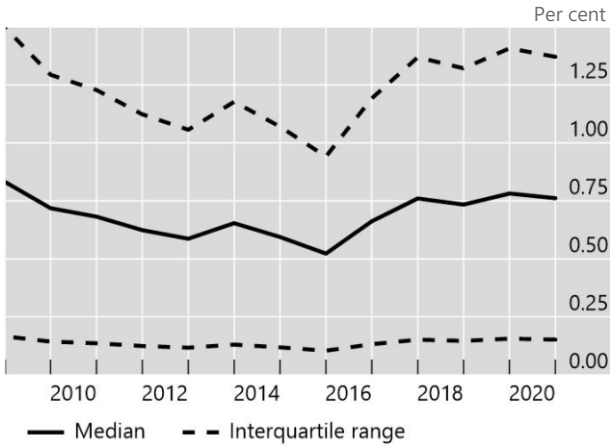
A counterfactual experiment: Effects on lending in the case of no dividend distribution

Graph 4

Cumulative dividends since 2007 have eroded bank equity[1]



Effects on the growth rate of lending[2]



[1] The sample includes 271 banks headquartered in 30 advanced economies. Data on dividends for 2019 are not included in the cumulate for banks not still reporting such figure. Retained earnings for 2019 are imputed as in 2018 for those banks still not reporting such figure. [2] The figure reports the effects on the growth rate of lending of an increase in capital due to no dividend distribution. The calculation is based on the coefficients of 26 models reported in FRAME. The median effect is indicated by the continuous line. The dotted lines indicate the interquartile range of the effects obtained dropping the first and the last quartile of the studies.

Sources: S&P Capital IQ; FRAME; authors' calculations.

To give a sense of the effects on lending, we conduct two separate simulations. The first simulation considers a banking model that studies the link between variation in bank capital and lending under the hypothesis of normal financial conditions – that is, the riskiness of bank loans remains constant. The second simulation, instead, assesses by how much bank loans would have increased under alternative stress scenarios that take into account increasing levels of bank loan risk; these second simulations more closely resemble the impact of dividend suspension on bank loans during an economic downturn such as the current pandemic crisis.

The first simulation aims at assessing the impact on the annual growth of lending in normal times, assuming that all distributed dividends are unpaid and are retained in the capital base. In particular, we use FRAME, the BIS public repository of studies on the effects of financial regulation, to collect the estimated multipliers on the link between bank capital and total loans (Boissay et al, 2019). FRAME collects 83 studies and 139 quantitative impact estimates from 15 countries or groups of countries on the effects of change in capital and/or liquidity ratios on banks' balance sheet components. In particular, 26 estimates refer to the one-year impact of a 1 percentage point increase in the capital ratio on lending growth. The median effect is 0.625%, ie a 1 percentage point increase in the capital ratio determines an increase of more than 0.6% in lending one year after. The interquartile range of the effects (dropping the first and the last quartile of the distribution of the effects reported in these studies) goes from 0.125% to 1.125%.

The right-hand panel of Graph 4 reports graphically the simulated annual impacts of increasing capital base on the annual growth rate of lending, assuming

that undistributed dividends are retained in banks' capital. It is worth remembering that the effects of changes in capital on lending are delayed by one year: profits accumulated and not distributed in t-1 enter into the quantification of lending in t.[10] The solid line represents the median effect among the studies, while the dotted lines correspond to the first and last quartile effects. From an economic point of view, the simulation shows that the accumulation of dividends would have favoured a median increase in the annual growth of lending of around 0.68% (with interquartile effects between 0.14% and 1.23%). The total effect over the period 2008–20 would have been a cumulative increase of lending of 8.9%, with a range between 1.8% and 16.0%, depending on the estimates taken into considerations. Limiting the analysis to the Covid-19 period, the results indicate that, if banks had stopped the distribution of the profit generated in 2019, the total effect would have been an increase in lending of 0.76%, with a range between 0.15% and 1.37%, depending on the models. This is represented graphically by the last point in the right-hand panel of Graph 4.

As mentioned above, the second simulation assesses by how much bank loans would have increased under different stress scenarios, such as the current pandemic crisis. In a similar way to the above simulation, we assume that profits obtained in the period 2007–19 have not been distributed but have instead been accumulated in banks' capital.[11] However, differently from before, we account for the fact that the multiplier between bank capital and loans tends to decline in a period of crisis because rising credit risk increases the risk weights used to calculate the risk-weighted capital ratios (Adrian et al, 2013).

We make the following assumptions based also on the analysis developed in Lewrick et al. (2020) for a global sample of 5,600 banks:

1) Banks employ the entire hypothetical capital buffer obtained in the case of no dividend distribution during the period 2007–19, equal to about US$1 trillion (Graph 4; left-hand panel), for additional lending; we assume that banks expand their balance sheet such that the CET1 capital ratios remain at the average current level of 14%, as observed in our sample at end–19. Together with the hypothesis that the entire amount of dividends is retained, we also consider the cases in which only a fraction of dividends are retained; we consider two additional cases: the first where 25% of dividends are retained and the second where half of dividends are retained.

2) Each bank keeps the ratio of customer loans to total assets constant, preserving the general structure of its balance sheet.

3) The risk-weighted asset density for loans (risk-weighted loans over total loans) is equal to 60% in normal periods, corresponding to the average RWA density among banks excluding the years of crisis. However, during a period of stress, the RWA density increases. We consider three possible scenarios:

    a. 100%, in an extremely severe shock scenario in which asset risk weights on average are equal to 1;

[10] For instance, by looking at the values of profits realised in 2019 and dividend distributed in the first part 2020, we can project the potential impact of a complete dividend suspension on lending in 2020.

[11] It is worth stressing that creating lending capacity by cutting dividends is preferable to reducing capital requirements, as the latter reduces banks' resilience.

b. 84%, in a severe shock scenario, similar to that during the Great Financial Crisis;

c. 72%, in an adverse shock scenario, such as the savings and loan crisis in the United States.

Table 5 reports the results of the simulations considering different assumptions and parametrisation. The upper panel considers profits generated in 2007–19, which generate an effect on lending in the period 2008–20. The bottom panel considers only profits generated in 2019, with the estimated impact on lending in 2020, during the Covid-19 crisis.

Table 5. Impact of limited or no dividend distribution on lending

	Stress scenarios[2]								
Dividend retained[1]	a. Unitary density function RWA/TA=1.00			b. Great financial crisis RWA/TA=0.84			c. Savings and loan crisis RWA/TA=0.72		
	I. Profits in 2007–19								
	trillion USD loans	in % GDP 2019	% credit 2019	trillion USD loans	in % GDP 2019	% credit 2019	trillion USD loans	in % GDP 2019	% credit 2019
25%	1.9	2.8	2.5	2.2	3.3	3.0	2.6	3.9	3.5
50%	3.7	5.6	5.0	4.4	6.7	5.9	5.2	7.8	6.9
100%	7.5	11.2	10.0	8.9	13.3	11.9	10.3	15.5	13.9
	II. Profits in 2019								
	trillion USD loans	in % GDP 2019	% credit 2019	trillion USD loans	in % GDP 2019	% credit 2019	trillion USD loans	in % GDP 2019	% credit 2019
25%	0.2	0.3	0.3	0.2	0.3	0.3	0.3	0.4	0.4
50%	0.4	0.6	0.5	0.5	0.7	0.6	0.5	0.8	0.7
100%	0.8	1.1	1.0	0.9	1.4	1.2	1.1	1.6	1.4

Notes: [1] We consider three scenarios depending on the fraction of dividends that are assumed to be not distributed and then retained in bank capital. The three fractions are 25%, 50% and 100% as displayed in column 1. [2] We consider three different stress scenarios in which the density function (risk-weighted assets (RWA) over total assets increases from 60% to respectively case a. 100%; case b. 84% and case c. 72%.

On the basis of these assumptions and parametrisations, a 100% suspension of dividends, which corresponds to the capitalisation of all profits, would free up balance sheet capacity for the issuance of additional loans equivalent to US$ 7.5–10.3 trillion, depending on the stress scenario under consideration. This corresponds to around 11.2–15.5% of the total GDP of the 30 advanced economies considered in our study, and, on average, to around 10.0–13.9% of total domestic credit to the private sector from banks in the post-Great Financial Crisis period. The table also reports the rescaled estimates in cases when 25% or 50% of the dividend distributed are retained in bank capital.

Interestingly, even forcing a stop on dividend distribution for all banks in 2020 only (on the profits generated in 2019) would have significant macroeconomic effects. The bottom panel of Table 5 shows that the additional lending would be in the range

of US$ 0.8–1.1 trillion given the different scenarios. This corresponds to around 1.1–1.6% of the total 2019 GDP of the 30 advanced economies considered in our study, and, on average, to around 1.0–1.4% of total domestic credit to private sector.

6. Conclusions

The aim of recent policy interventions after the Covid-19 shock has been to dampen the impact of the economic shock on the banking system. As well as the losses incurred by banks due to credit losses, bank lending may also be impacted by the greater caution of lenders due to the prospect of an economic downturn. Bank lending tends to be procyclical due in part to the tightening of lending standards in response to deteriorated economic conditions (Lewrick et al., 2020). The banking sector has been a source of relative strength in the pandemic-induced economic shock, unlike during the Great Financial Crisis. In this respect, banks have been a part of the solution, not a part of the problem (Carstens, 2020). Guidance by supervisors to conserve bank capital through dividend suspensions is motivated by the aim of building buffers that enable the banking sector to support economic activity.

In this paper, we have shown that the incentive for banks to distribute dividends is greater when the price-to-book ratio falls, especially below one, a situation that characterises many banks in advanced economies at the current juncture, especially in the euro area. In this context, to shore up their capital base, banks should suspend dividend distributions and share buybacks, as recommended by a number of regulators and banking federations in response to the pandemic crisis.

Accordingly, in counterfactual simulations, we have shown that, if banks were not to distribute dividends but to accumulate them in their capital base, the effects on lending would have been substantial. Over the period 2008–20, bank lending capacity would have been around 9% greater. Overall, under adverse scenario considerations, around US$ 7.5–10.3 trillion in additional lending could have been supplied. This corresponds to roughly 11.2–15.5% of the GDP of the 30 advanced economies considered in this study.

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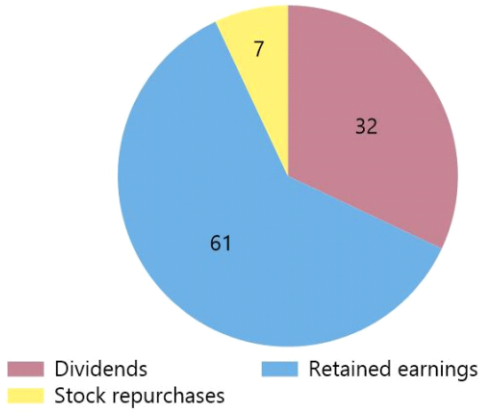
Annex

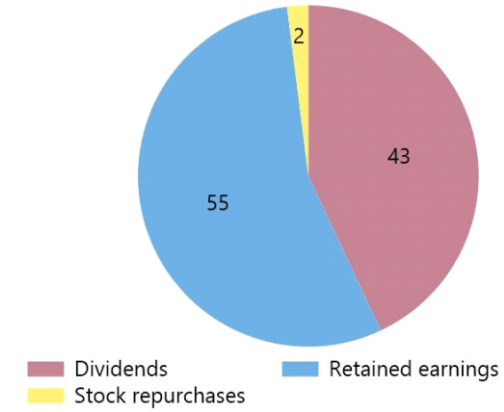
Dividends, stock repurchases and retained earnings

In per cent — Graph A1

Euro Area



Other advanced economies



The figure displays how banks' profits are allocated. It considers the average shares of dividends, stock repurchases and annual changes in retained earnings over the period 2005-2019 for the sample of euro area banks (left-hand chart) and the sample of banks headquartered in other advanced countries (right-hand chart).

Sources: S&P Capital IQ.

Table A1. Dividend payout and price-to-book ratio below one in banks

	(I)	(II)	(III)	(IV)	(V)	(VI)
			PBR (Low) thresholds			
	>1	>0.9	>0.8	>0.7	>0.6	>0.5
	Dividend payout (0/1)					
	Banks (advanced economies)					
Return on equity (%)	0.0094***	0.0094***	0.0093***	0.0093***	0.0093***	0.0093***
	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)
Log(Market Capitalization)	0.0195***	0.0192***	0.0188***	0.0185***	0.0181***	0.0177***
	(0.0036)	(0.0037)	(0.0037)	(0.0037)	(0.0036)	(0.0037)
Price-to-book ratio (*PBR*)	-0.0156***	-0.0166***	-0.0181***	-0.0196***	-0.0214***	-0.0200***
	(0.0049)	(0.0048)	(0.0046)	(0.0045)	(0.0044)	(0.0045)
Growth rate of total assets (%)	-0.0002	-0.0002	-0.0002	-0.0002	-0.0003	-0.0002
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)
PBR x *PBR*(Low)	-0.0165	-0.0290	-0.0536**	-0.0939***	-0.1863***	-0.2333***
	(0.0182)	(0.0207)	(0.0243)	(0.0285)	(0.0388)	(0.0497)
Observations	3,459	3,459	3,459	3,459	3,459	3,459
R-squared	0.321	0.3213	0.3220	0.3235	0.327	0.327
Year FE	Y	Y	Y	Y	Y	Y
Country FE and GDP growth	Y	Y	Y	Y	Y	Y

Notes: OLS estimation with robust standard errors in brackets. Significance level: *p<0.1; ** p<0.05; *** p<0.01. *PBR*(Low) is a dummy variable that identifies banks with *PBR* ≤ 1 in column (I), with *PBR* ≤ 0.9 in column (II), with *PBR* ≤ 0.8 in column (III), with *PBR* ≤ 0.7 in column (IV), with *PBR* ≤ 0.6 in column (V) and with *PBR* ≤ 0.5 in column (VI).

Table A2. Dividend payout and price-to-book ratio – robustness test using quartiles of the *PBR* distribution

	(I)	(II)	(III)
		Dividend payout (0/1)	
		Banks (advanced economies)	
Return on equity (%)	0.0102***	0.0099***	0.0092***
	(0.0007)	(0.0007)	(0.0007)
Log(Market Capitalization)	0.0307***	0.0307***	0.0176***
	(0.0029)	(0.0029)	(0.0037)
Price-to-book ratio (*PBR*)	-0.0521***	-0.0541***	-0.0502***
	(0.0157)	(0.0157)	(0.0157)
Growth rate of total assets (%)	-0.0001	-0.0002	-0.0002
	(0.0004)	(0.0004)	(0.0004)
PBR x *PBR*(Very Low)	-0.2284***	-0.2221***	-0.2564***
	(0.0443)	(0.0448)	(0.0462)
PBR x *PBR*(Low)	-0.0437**	-0.0470**	-0.0234
	(0.0214)	(0.0215)	(0.0207)
PBR x *PBR*(High)	0.0248*	0.0262*	0.0228*
	(0.0134)	(0.0134)	(0.0134)
Observations	3,459	3,459	3,459
R-squared	0.192	0.202	0.3292
Year FE	N	Y	Y
Country FE and GDP growth	N	N	Y

Notes: OLS estimation with robust standard errors in brackets. Significance level: *p<0.1; ** p<0.05; *** p<0.01. *PBR*(Very Low) identifies banks with a price-to-book ratio (*PBR*) below the first quartile of the *PBR* distribution (*PBR*≤ 0.58). *PBR*(Low) identifies financial institutions with *PBR* above the first quartile and below the second quartile of the *PBR* distribution (*PBR*>0.68 and *PBR*≤ 0.9). *PBR*(High) identifies financial institutions with *PBR* above the third quartile of the *PBR* distribution (*PBR*>1.43).

Table A3. Dividend over book value of equity and price-to-book ratio

	(I)	(II)	(III)
	Dividend payments/Total Equity		
	Banks (advanced economies)		
Return on equity (%)	0.0012***	0.0013***	0.0012***
	(0.0001)	(0.0001)	(0.0001)
Log(Market Capitalization)	0.0002	0.0000	0.0008*
	(0.0003)	(0.0003)	(0.0004)
Price-to-book ratio (*PBR*)	0.0166***	0.0158***	0.0151***
	(0.0033)	(0.0033)	(0.0033)
Growth rate of total assets (%)	-0.0002***	-0.0003***	-0.0003***
	(0.0001)	(0.0001)	(0.0001)
PBR x *PBR*(Low)	-0.0133***	-0.0157***	-0.0202***
	(0.0038)	(0.0038)	(0.0038)
PBR x *PBR*(High)	0.0049**	0.0058***	0.0056**
	(0.0022)	(0.0022)	(0.0022)
Observations	3,440	3,440	3,440
Year FE	N	Y	Y
Country FE and GDP growth	N	N	Y
Pseudo R-squared	-0.331	-0.345	-0.428

Notes: Tobit estimation with robust standard errors in brackets. Significance level: *p<0.1; ** p<0.05; *** p<0.01. *PBR*(Low) identifies banks with a price-to-book ratio (*PBR*) below the first tercile of the *PBR* distribution (*PBR*≤ 0.67). *PBR*(High) identifies financial institutions with *PBR* above the second tercile of the *PBR* distribution (*PBR* > 1.22).

Table A4. Dividend over market capitalization and price-to-book ratio

	(I)	(II)	(III)
	Dividend payments/Market capitalization		
	Banks (advanced economies)		
Return on equity (%)	0.0009***	0.0009***	0.0007***
	(0.0001)	(0.0001)	(0.0001)
Log(Market Capitalization)	-0.0000	-0.0001	0.0003
	(0.0003)	(0.0003)	(0.0003)
Price-to-book ratio (*PBR*)	-0.0025	-0.0031*	-0.0034**
	(0.0018)	(0.0018)	(0.0017)
Growth rate of total assets (%)	-0.0001***	-0.0002***	-0.0001***
	(0.0000)	(0.0000)	(0.0000)
PBR x *PBR*(Low)	-0.0095***	-0.0110***	-0.0134***
	(0.0029)	(0.0029)	(0.0028)
PBR x *PBR*(High)	0.0013	0.0018	0.0017
	(0.0015)	(0.0016)	(0.0015)
Observations	3,433	3,433	3,433
Year FE	N	Y	Y
Country FE and GDP growth	N	N	Y
Pseudo R-squared	-0.0368	-0.0483	-0.148

Notes: Tobit estimation with robust standard errors in brackets. Significance level: *p<0.1; ** p<0.05; *** p<0.01. *PBR*(Low) identifies banks with a price-to-book ratio (*PBR*) below the first tercile of the *PBR* distribution (*PBR*≤ 0.67). *PBR*(High) identifies financial institutions with *PBR* above the second tercile of the *PBR* distribution (*PBR* > 1.22).

Table A5. Dividend payout probability and price-to-book ratio in banks – controlling for retained earnings over total equity

	(I)	(II)	(III)
		Dividend payout (0/1)	
		Banks (advanced economies)	
Return on equity (%)	0.0090***	0.0087***	0.0078***
	(0.0008)	(0.0008)	(0.0008)
Log(Market Capitalization)	0.0307***	0.0305***	0.0183***
	(0.0029)	(0.0029)	(0.0037)
Price-to-book ratio (*PBR*)	-0.0503***	-0.0508***	-0.0297*
	(0.0177)	(0.0178)	(0.0178)
Growth rate of total assets (%)	-0.0001	-0.0001	-0.0002
	(0.0004)	(0.0004)	(0.0004)
PBR x *PBR*(Low)	-0.1127***	-0.1029***	-0.1143***
	(0.0316)	(0.0317)	(0.0314)
PBR x *PBR*(High)	0.0328**	0.0333**	0.0140
	(0.0156)	(0.0158)	(0.0155)
Retained earnings over total equity (%)	0.0004***	0.0004***	0.0006***
	(0.0001)	(0.0001)	(0.0002)
Observations	3,335	3,335	3,335
R-squared	0.202	0.212	0.3406
Year FE	N	Y	Y
Country FE and GDP growth	N	N	Y

Notes: OLS estimation with robust standard errors in brackets. Significance level: *p<0.1; ** p<0.05; *** p<0.01. *PBR*(Low) identifies banks with a price-to-book ratio (*PBR*) below the first tercile of the *PBR* distribution (*PBR*≤ 0.67). *PBR*(High) identifies financial institutions with *PBR* above the second tercile of the *PBR* distribution (*PBR* > 1.22).

Table A6. Dividend payout probability and price-to-book ratio in banks – controlling for leverage

	(I)	(II)	(III)
		Dividend payout (0/1)	
		Banks (advanced economies)	
Return on equity (%)	0.0087***	0.0085***	0.0077***
	(0.0008)	(0.0008)	(0.0008)
Log(Market Capitalization)	0.0353***	0.0349***	0.0208***
	(0.0031)	(0.0031)	(0.0038)
Price-to-book ratio (*PBR*)	-0.0557***	-0.0553***	-0.0305*
	(0.0179)	(0.0180)	(0.0179)
Growth rate of total assets (%)	-0.0001	-0.0001	-0.0001
	(0.0004)	(0.0004)	(0.0004)
PBR x *PBR*(Low)	-0.1111***	-0.1007***	-0.1133***
	(0.0313)	(0.0314)	(0.0314)
PBR x *PBR*(High)	0.0400**	0.0393**	0.0159
	(0.0158)	(0.0159)	(0.0155)
Retained earnings over total equity (%)	0.0005***	0.0005***	0.0006***
	(0.0001)	(0.0001)	(0.0002)
Debt over total equity	-0.0037***	-0.0035***	-0.0017**
	(0.0008)	(0.0008)	(0.0008)
Observations	3,335	3,335	3,335
R-squared	0.208	0.2170	0.342
Year FE	N	Y	Y
Country FE and GDP growth	N	N	Y

Notes: OLS estimation with robust standard errors in brackets. Significance level: *p<0.1; ** p<0.05; *** p<0.01. *PBR*(Low) identifies banks with a price-to-book ratio (*PBR*) below the first tercile of the *PBR* distribution (*PBR*≤ 0.67). *PBR*(High) identifies financial institutions with *PBR* above the second tercile of the *PBR* distribution (*PBR* > 1.22).

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