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Competition and bank dividends

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ABSTRACT

We investigate the impact of state level competition on bank dividends following the passage of the US Interstate Banking and Branching Efficiency Act (IBBEA). Using a sample of top-tier US bank holding companies, we find that in states where extensive deregulation leads to intensified competition, banks pay fewer dividends relative to counterparts operating in states where deregulation took place more slowly. These findings are stronger for banks with lower expected future earnings, suggesting that competition reduces the ability of lower performing banks to continue paying dividends. We also find that banks operating in states characterised by higher competition and less supervisory oversight pay higher dividends than counterparts operating in similarly competitive states with stricter supervision.

1. Introduction

Over the past 40 years, the banking industry in the United States (US) and elsewhere has undergone extensive geographic and product market deregulation (Berger et al., 1995; DeYoung, 2019). This deregulation has transformed the banking industry by increasing competition and boosting the efficiency of incumbent banks (Stiroh and Strahan, 2003; Angelini and Cetorelli, 2003; Claessens and Laeven, 2004; Meslier et al., 2016). Prior evidence suggest there are links between competition and a myriad of bank level strategic decisions.[1] However, evidence regarding the impact of product market competition on bank dividend policy is rather limited. This is somewhat surprising given that the dividend policy decisions made by banks are likely to have significant implications for agency costs (Easterbrook, 1984; La Porta et al., 2000; Grullon et al., 2019) and the extent of information asymmetries between managers and outside stakeholders (Miller and Modigliani, 1961; Bhattacharya, 1979; Miller and Rock, 1985; Turner et al., 2013; Chronopoulos et al., 2022).

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[1] These include: capital structure (Inderst and Muller, 2008; Allen et al, 2011; DeAngelo and Stulz, 2015), loan portfolio composition (Chen et al, 1986; Niu, 2008), pricing of products (Hannan and Prager, 1998; Saunders and Schumacher, 2000; Coccorese and Pellecchia, 2013) and lending relationships with borrowers (Petersen and Rajan, 1995; Degryse and Ongena, 2007).

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In this study, we investigate the impact of deregulation and resultant increased competition on bank dividend policy. We focus on the banking industry given the obvious importance of banks as safe havens for surplus funds and credit providers to households, small- and medium-sized firms, corporations and governments within the financial system and the real economy (Berger, et al., 2020). The deregulation that has taken place in the banking industry and the fact that a large majority of banking institutions choose to pay dividends (Floyd et al., 2015) provides an ideal laboratory to investigate how changes in competition (following deregulation) affect dividends.

Given the discretionary nature of dividend policy, it is unclear whether returns to shareholders are likely to change following an increase in competition. Previous studies offer contrasting views regarding the impact of competition on bank dividend policy. One strand of research suggests that competition may increase bank dividends by inducing bank managers to dispense free cash flows (Grullon et al., 2019). By reducing monitoring costs and generating greater opportunities for investors to benchmark the performance of bank managers against peers (Holmström, 1982; Nalebuff and Stiglitz, 1983; Shleifer, 1985), more competition increases the chance of managerial overinvesting being discovered. As such, the managerial cost of overinvesting increases with intensifying competition. Therefore, increases in competition can induce banks to reduce overinvesting and disburse excess cash through increased dividends.

The extant literature also suggests mechanisms through which competition can lead to lower dividends. Competition can lead to a decline in bank profitability, and reduce the funds available to payout in the form of dividends (Hoberg et al, 2014). Given that stability and sustainability of earnings play a central role in dividend policy (Lintner 1956; Baker, et al., 1985; Brav et al., 2005), banks subject to increased competition anticipate lower profitability and reduce dividends. Moreover, competition can mitigate agency problems (Grullon et al., 2019) by improving the volume and quality of public information disclosure (Darrough and Stoughton, 1990; Li, 2010; Jiang et al., 2016; Burks et al., 2018), and allow shareholders to monitor managers more effectively (Bushman and Smith, 2001). Therefore, increased competition can induce more efficient cash flow management, resulting in banks paying lower dividends.

Testing the relationship between competition and dividend policy (or any corporate finance policy for that matter) is not straightforward due to endogeneity concerns. Bank managers may choose which market to operate in and decide a variety of financial policies simultaneously (Graham et al., 2005). Consequently, it is difficult to disentangle the effect of competition on bank dividends, unless one has a source of exogenous variation in the level of competition facing banks.

In order to address the aforementioned concerns, we use a quasi-natural experiment to investigate how a change in state level competition following US inter-state bank branching deregulation influences bank dividend policy. Commencing in the 1970s, and continuing throughout the 1980s and 1990s, the US banking industry experienced a significant reduction in restrictions on bank location (Berger, Kashyap and Scalise, 1995; DeYoung, 2019). In the early 1980s, many states began to allow out-of-state banks to enter and compete with incumbent banks. This culminated in the US Congress passing the Riegle-Neal Interstate Banking and Branching Efficiency Act (IBBEA) in 1994. The IBBEA removed many of the restrictions on opening bank branches across state lines, thus formally allowing banks to establish branches outside of their headquartered state.[2] However, the IBBEA also granted individual states the right to impose restrictions to prohibit the entry of out-of-state banks. Individual states could impose up to four restrictions relating to: the minimum age of a target institution (Minimum Age); de novo interstate branching (De Novo Branching); the acquisition of individual bank branches (Acquisition); a state-wide deposit cap (Deposit Cap).[3] As a result, the level of competition facing incumbent banks continued to vary across states following the passage of the IBBEA. Using information regarding these aforementioned restrictions, we follow prior literature (Rice and Strahan, 2010) to develop a time-varying restrictiveness index covering the period 1994 to 2005. We use this index within a difference-in-differences framework in order to estimate the causal effect of competition on bank dividends (utilizing a two-way fixed effect estimator). We corroborate our findings with a number of recently developed alternative estimators that account for the potential bias of the two-way fixed effect estimator in staggered difference-in-differences designs (Borusyak et al., 2022; Callaway and Sant'Anna, 2021; de Chaisemartin and D'Haultfoeuille, 2022).

Our dataset comprises annual financial statements of top-tier US bank holding companies (BHC) over the period 1994 to 2005, obtained from Federal Reserve Bank FRY-9C (consolidated financial statements for bank holding companies) regulatory reports. Our period of analysis is determined primarily by the passage of the IBBEA Act in 1994, and the availability of the Rice and Strahan (2010) index that spans the years 1994–2005. The findings of an extensive econometric analysis suggest that competition influences bank dividend policy. In particular, we find that banks operating in more competitive markets (i.e. in states where restrictions on out-of-state entry are looser) pay fewer dividends relative to counterparts operating under less competition. This effect is also economically significant. The results of further analyses (which decomposes the time varying restrictiveness index into four constituent parts) suggests that the relationship between competition and dividends is driven by the removal of deposit market cap and de novo interstate branching restrictions.[4] We also find that variation in supervisory scrutiny across states moderates the effect of competition on bank dividends. Banks operating in states with more lenient regulators are affected less by increased competition following deregulation.

[2] The IBBEA effectively repealed the federal geographic banking restrictions introduced under the McFadden Act of 1927 (Berger et al., 1995; Spong, 2000; DeYoung, 2019).

[3] Rice and Strahan (2010, p.866–867) provide a detailed description of these restrictions.

[4] Prior evidence suggest that deposit cap restrictions are more effective than other restrictions in reducing competition from out of state banks (Johnson and Rice, 2008; Nguyen et al., 2017).

We conduct an additional analysis to investigate the extent to which profitability and / or agency issues related to free cash flow affect bank dividend policies in states characterized by lower or higher levels of competition. The results suggest that banks with higher expected profitability are less affected by increased competition following deregulation. In particular, banks that have lower expected earnings experience a reduced ability to pay dividends relative to counterparts with better cash flow prospects. We find no evidence supporting the view that banks rely less on dividends to signal good cash flow management after competition increases. Overall, the results of this study suggest that dividends convey credible private information regarding future performance to less informed outsiders, and this is enhanced for banks operating in more stringent supervisory environments.

To examine the robustness of our findings, we carry out several additional tests. We control for state fixed effects, state-specific linear time trends and state level time-varying variables in order to capture both the economic environment banks operate in as well as any state level unobserved factors that could bias our empirical findings. In addition, we account for the possibility that multi-state bank presence could drive our results using two approaches: (i) by restricting the sample to those banks operating in a single state, and (ii) weighting each bank's competition measure by their relative state level deposits size (Berger et al., 2022). Our findings remain qualitatively unchanged across all alternative estimations. Moreover, our findings are also robust to the use of alternative measures of dividend payout, including the ratio of dividends-to-equity and the ratio of dividends-to-total assets. Our findings remain unaltered even when we partition the sample based on the ownership structure of banks (public versus privately owned banks). We also examine the internal validity of our estimations in order to confirm the causal interpretation of our results by conducting a number of placebo tests and a contiguous counties level analysis. The results suggest that our findings are not driven by secular trends, reverse causality or (observed or unobserved) omitted shocks that could have occurred around the timing of deregulatory events. In addition, we utilize a coefficient stability test (proposed by Oster, 2019) to investigate possible omitted variable bias in our estimates. The results of this test suggest our findings are not driven by unobservable characteristics.

We contribute to several strands of the literature. First, this paper adds to prior limited work that investigates the relationship between product market competition and dividend policy for non-financial firms. For example, Hoberg et al. (2014) show that higher competition reduces dividends. In contrast, Grullon et al. (2019) show that corporates in industries with lower market concentration (a proxy for higher competition) pay more dividends. Unlike these inter-industry studies, our paper provides evidence for a single industry using a regulatory reform that lowered barriers to entry and increased competition among banks, which in turn led to a decline in dividends.

Second, our study also contributes to the literature that studies the link between dividend payout policy and firm's future earnings prospects. Surveys indicate that managers view dividends as a means to convey information about future earnings of firms (Baker et al., 2001; Brav et al. 2005). Nevertheless, the evidence for financial (Kein, 1978; Hirtle, 2004; Theis and Dutta, 2009; Cziraki et al., 2022) and non-financial firms (Benartzi et al., 1997; Nissim and Ziv, 2001; Ham et al., 2020) provides mixed results regarding the information content of dividends. In particular, Keen (1978) shows that bank dividend reductions are followed typically by higher bank profitability. More recently, Theis and Dutta (2009) find no significant relationship between bank profitability and dividend payouts, while Hirtle (2004) and Cziraki et al. (2022) provide evidence which suggests that bank dividend increases are followed by higher profits. The results presented in our study lend support to the notion that bank managers use dividends to convey information about future performance. Specifically, we find that banks' dividend policy is determined by management expectations regarding future profitability formed following an increase in (deregulation induced) competition.

We also contribute to the literature that investigates the influence of supervisory oversight on bank dividend policy. Prior evidence suggests that both supervisory oversight and pressure is an important determinant of bank dividend policy (Abreu and Gulamhussen, 2013; Kanas, 2013; Onali, 2014). We augment this literature to show that supervisory oversight moderates the impact of increased competition on bank dividends. Competition is associated with a smaller reduction in dividends in states with more lenient bank supervision.

Finally, we contribute to the substantial literature regarding the impact of US geographic bank deregulation on bank behavior. Results emanating from this literature suggest that deregulation has a significant impact on bank behavior via reduced risk taking (Goetz, 2018), increased transparency (Jiang et al., 2016), increased efficiency (Humphrey and Pulley, 1997; Jayaratne and Strahan, 1998; DeYoung et al., 1998; Stiroh and Strahan, 2003; Evanoff and Ors, 2008; Nguyen et al., 2018) and improved capitalization (Berger, et al., 2022).[5] We show that competition reduces incentives for banks to pay dividends and thus allows earnings to be retained and accumulated for future use.

The remainder of this study is structured as follows. Section 2 presents our identification strategy, empirical specification, dataset and descriptive statistics. Empirical findings are presented in Section 3, while Section 4 present the results of a series of additional tests. Section 5 concludes.

[5] In addition to influencing bank behaviour, documented evidence suggests that the deregulation of the US banking industry had a significant impact on real economic outcomes. Jayaratne and Strahan (1996) show that state level output increases following the relaxation of bank branch restrictions. Moreover, there is evidence that bank deregulation: increases credit supply (Rice and Strahan, 2010); tightens the income distribution of households (Beck et al., 2010); promotes entrepreneurship (Black and Strahan, 2002; Kerr and Nanda, 2009); reduces firm risk (Jiang, et al. 2020); increases firm innovation (Cornaggia et al., 2015); increases house prices (Favara and Imbs, 2015); and increase cost of equity for banks (Berger et al., 2022). Berger, et al. (2020) provide a review of the literature.

2. Identification strategy, empirical specification, and data

2.1. Interstate branching deregulation

Assessing the impact of competition on bank dividend policy is challenging given that competition is unlikely to be orthogonal to other unobserved factors influencing bank dividend policy. We aim to alleviate such endogeneity concerns by exploiting the staggered deregulation of interstate bank branching enacted in the 1990s. The US Congress passed the Riegle-Neal Interstate Banking and Branching Efficiency Act (IBBEA) in 1994, which formally legalized the statewide branching and interstate banking that started in the early 1970s, and subsequently spread across states (Berger, et al., 1995; Spong, 2000; DeYoung, 2019). Moreover, the IBBEA also allowed interstate branching starting in 1997. Johnson and Rice (2008) show that the interstate branching deregulation increased the number of out-of-state bank branches and competition within states. Fig. 1 presents a timeline of intrastate and interstate deregulation in US banking from 1970 to 2005.

One feature of the IBBEA was that states retained discretion and flexibility over implementation. This led to differences in competition across states that persisted over time. Such variations in competition across states and over time allows us to test the impact of competition on bank dividends, while controlling for other possible confounding events.[6]

The IBBEA allowed states to restrict the entry of out-of-state branches by imposing restrictions or prohibitions on: de novo interstate branching; the minimum age of the target institutions for acquisitions; acquisitions of an individual branch or a portion of an institution; and any branch acquisition of in-state banks that held more than 30% of the deposits in that state. Using information of these aforementioned restrictions, Rice and Strahan (2010) construct a time-varying regulatory restrictiveness index across US states from 1994 to 2005. The index value ranges between zero and four (zero if a state does not implement any of the restrictions and four if a state implements all four restrictions). In other words, higher values of the index are indicative of less competition among banks in a state. For ease of interpretation (and following Favara and Imbs, 2015), we use the inverse of this index, which we denote as *DREG*.[7] We set *DREG* to 0 in 1994, and add 1 if a given state lifts one of the restrictions described above. Therefore, *DREG* ranges from 0 to 4, with higher values implying fewer restrictions on the entry of out-of-state banks.[8] We also decompose *DREG* into four constituent parts in order to understand which regulatory restrictions underlie our baseline findings.

2.2. Empirical specification

To examine the relationship between competition and bank dividend policy we employ a two-way fixed effects estimator (and also confirm the robustness of our baseline results using alternative estimators, which account for biases associated with the use of two-way fixed effects in staggered difference-in-differences settings). Specifically, we estimate the following equation:

$$Y_{i,s,t} = \beta DREG_{s,t-1} + \delta X_{i,s,t-1} + a_i + \gamma_t + \epsilon_{i,s,t} \tag{1}$$

where i indexes bank, s indexes state, and t indexes time. In line with prior literature on bank dividend policy (Kanas, 2013; Onali et al., 2016; Johari et al., 2020), $Y_{i,s,t}$ denotes the change in dividends normalized by the lagged value of total bank equity. $DREG_{s,t}$ is an index of banking competition in state s and at time t. The index value ranges from 0 to 4. Higher values imply higher competition in the banking market following the removal or relaxation of the entry barriers by a given state. $X_{i,s,t-1}$ is a vector of bank level control variables that vary over time and across banks. These control variables include size, profitability, liquidity, capitalization, and risk (see Section 2.4 for a discussion of variables). a_i and γ_t denote bank and year fixed effects respectively. $\epsilon_{i,s,t}$ is the error term.

We estimate Equation (1) using Ordinary Least Squares (OLS). In order to control for spatial correlation arising from the state-specific variation in deregulation standard errors are clustered at the state level (Bertrand et al., 2004; Abadie et al., 2017). The coefficient of interest, β, captures the impact of deregulation on bank dividends.

2.3. Data and sample

We use information collected from the annual financial statements of US bank holding companies (BHC) over the period 1994 to 2005, obtained from FRY-9C reports (consolidated financial statements for bank holding companies).[9] These regulatory filings are accessed via the Federal Reserve Bank of Chicago.[10] The period of analysis is determined primarily by the passage

[6] If regulators use information regarding the financial health of the industry by observing dividend policy changes then our analysis could suffer from simultaneity bias. In unreported tests (in the spirit of Kroszner and Strahan, 1999), we find that changes in banks' dividends have no impact on the timing of a state's decision to deregulate.

[7] Other studies have used this index to gauge the impact of banking competition on firm innovation (Cornaggia et al., 2015) and bank capitalization (Berger et al., 2022).

[8] As in Favara and Imbs (2015), the states are assumed fully restricted in 1994 (takes the value of 0) and become less restricted (the value of 1 to 4) following the IBBEA passage in 1994 by lifting one or more among the four restrictions.

[9] We refer to bank holding companies (BHCs) as banks throughout the remainder of this study for convenience.

[10] The forms are accessed at https://www.chicagofed.org/banking/financial-institution-reports/bhc-data.

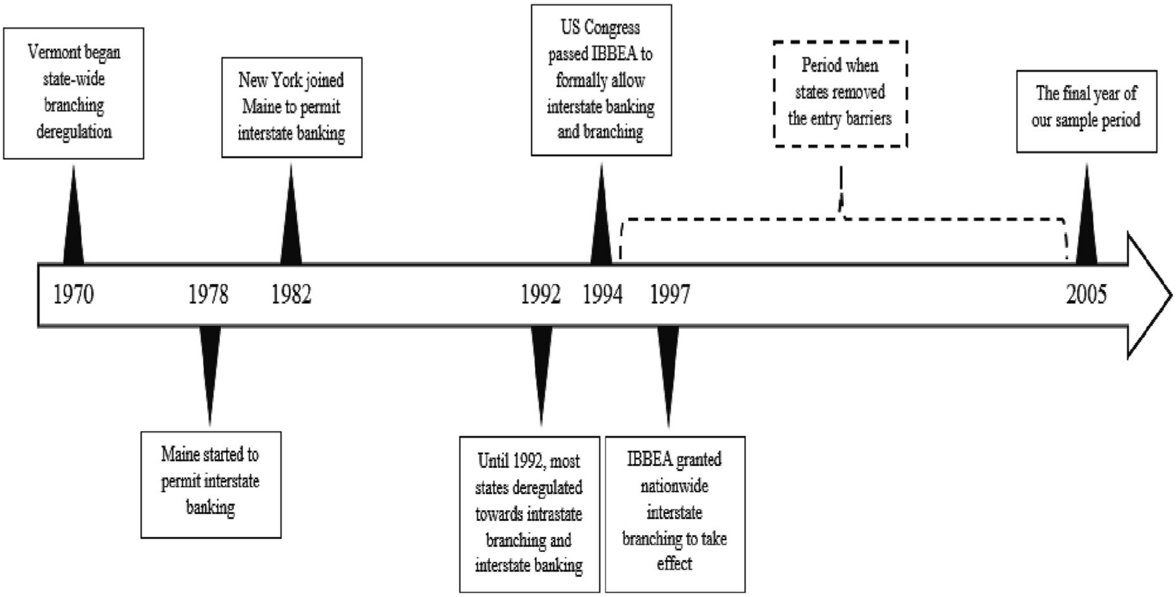

Fig. 1. US banking deregulation timeline from 1970 to 2005. Source: Rice and Strahan (2010, p. 870)

of the IBBEA Act, and the availability of the Rice and Strahan (2010) index. We start our sample selection process by retaining domestic top-tier BHCs.[11] Then, we exclude observations with negative total equity values. In the next step, we exclude banks with missing state-of-(headquarters')-location information and banks located outside the mainland US territories. In order to mitigate the effects of outliers, we winsorize the data at 1st and 99th percentiles. Our final dataset comprises an unbalanced panel of 2,563 top-tier bank holding companies with 16,188 bank-year observations. In our subsequent estimations, we also collect information on: deposit market shares from the Federal Deposit Insurance Corporation (FDIC) Summary of Deposits; Gross State Product (GSP) from the Bureau of Economic Analysis; state coincident index data from the Federal Reserve Bank of Philadelphia; and state economic freedom index data from the Fraser Institute.

2.4. Variable definitions and summary statistics

Competition is measured using a geographic deregulation index, *DREG*, which takes values between 0 and 4. We acknowledge that banks may have presence outside the state they are headquartered in. Following Berger et al. (2022) we also use a weighted version of *DREG*, where the weights applied are based on the proportion of bank deposits in every state that the bank has a physical presence.

We also control for other factors that are likely to affect bank dividend policy. Other control variables comprise bank size, profitability, liquidity, capitalization, and risk. Bank size is measured by the natural logarithm of total assets ($thousands). Profitability is measured by the return on assets. We expect larger and more profitable banks to pay higher dividends (Fama and French, 2001; Abreu and Gulamhussen, 2013). Bank liquidity is measured as the ratio of cash to total assets (DeAngelo et al., 2006). Banks that have cash in excess of reserve requirements have an incentive to actively manage liquidity. The relationship between liquidity and dividends can be positive or negative depending on whether banks use cash to fund dividends to shareholders (positive effect) or boost internal cash reserves and capital (negative effect).

Bank capitalization is measured by the ratio of equity to total assets. We expect banks with lower capital ratios to pay lower dividends, so as to prevent capital from falling below minimum regulatory requirements. Prior evidence suggests that banks with capital ratios close to regulatory minima reduce dividends so as to avoid regulatory action (Abreu and Gulamhussen, 2013). Risk is measured as the ratio of non-performing loans to total loans. Higher values of this ratio indicate higher risk (Forti and Schiozer, 2015). Prior evidence for non-financial firms suggests that there is a negative relationship between risk and dividends (DeAngelo et al., 2006). However, evidence for banking suggests an ambiguous relationship. For example, Onali (2014) shows that dividends and bank risk-taking are positively related, while Forti and Schiozer (2015) provide evidence which suggests the opposite. Table 1 provides detailed definitions of the variables used in our empirical analysis.

In order to gain initial insights regarding the evolution of bank dividends, we plot both the fraction of banks that paid dividends during the period from 1994 through 2005, as well as the amount of cash dividends distributed by banks during the same period. Fig. 2 indicates that the fraction of banks paying dividends remains well above 75% and is relatively stable

[11] We keep only observations of BHCs that are either not owned by another entity or if they are a subsidiary the parent company does not file an FRY-9C.

Table 1
Variable definitions and sources.

Variables	Definition	FR Y-9C Mnemonics and data sources
Change in Dividends	Change in dividends scaled to lagged total equity (%)	Dividends (BHCK4460); Total Equity (BHCK3210)
DREG	Inverse Rice and Strahan's (2010) index on interstate branching deregulation	Rice and Strahan (2010)
Weighted DREG	Weighted DREG based on BHC nationwide deposit market shares	Authors' calculations based on deposit data from FDIC Summary of Deposit
Size	Natural log of total assets	Total Assets (BHCK2170)
Profitability	Return on assets (Net income to total assets)	Net Income (BHCK4340); Total Assets (BHCK2170)
Liquidity	Cash to total assets	Cash (BHCK0081 + BHCK0395 + BHCK0397); Total Assets (BHCK2170)
Capitalization	Equity capital to total assets	Total Equity (BHCK3210); Total Assets (BHCK2170)
Risk	Non-performing loans to total loans	Non Performing Loans (BHCK1616 + BHCK5526-BHCK3507); Total Loans (BHCK2122)
HHI	Herfindahl-Hirschman Index (HHI) based on deposit market shares in 1993	Authors' calculations based on deposit data from FDIC Summary of Deposit
Sup Leniency	A binary variable that takes the value of one for banks headquartered in a state where Agarwal et al (2014) measure takes a positive value and zero otherwise	Agarwal et al. (2014)
Expected	Profitability	A binary variable that takes the value of one for banks with positive current expectations about future profits and zero otherwise
Authors'	calculations	
HCLG	A binary variable that takes the value of one for banks with above median cash flow (high cash flow) and below median asset growth (low growth opportunities), and zero otherwise	Operating Income (BHCK4074 + BHCK4079-BHCK4093); Total Assets (BHCK2170)
Wages	A binary variable that takes the value of one if banks pay wages (defined as the ratio of personnel expense to the number of employees) above the sample mean and zero otherwise	Salaries and Employees Benefits (BHCK4135); Number of FTEs on Payroll (BHCK4150)
Overhead Costs	A binary variable which equals one if banks have overheads (defined as non-interest expense to total assets) above the sample mean and zero otherwise	Total Non-Interest Expense (BHCK4093); Total Assets (BHCK2170)
Peer	The average dividend change of all banks in state *s* except bank *i* in year *t*	Authors' calculations
PCA	A binary variable which equals one if: a bank's total risk-based capital ratio falls below 8%; its tier 1 risk-based capital ratio falls below 4%; or its tier 1 leverage ratio falls below 4%, and zero otherwise	Total Risk-based Capital (BHCK3792); Tier 1 Risk-based Capital (BHCK8274); Average Total Assets (BHCKA224)
Tax	State level statutory corporate income tax rate	US Master Multistate Corporate Tax Guide
SOX	A binary variable which equals one for publicly listed banks after the implementation of the Sarbanes-Oxley Act in 2002 and zero otherwise	Publicly listed banks are sourced from CRSP-FRB link table published by the Federal Reserve Bank of New York.
Log GSP	Natural log of gross state product	Bureau of Economic Analysis
Coincident Index	Index that summarizes state level economic conditions. It combines four variables: Nonfarm payroll employment, average hours worked in manufacturing by production workers, the unemployment rate, and wage and salary disbursements.	Federal Reserve Bank of Philadelphia
Freedom Index	State-level index of economic freedom	Fraser Institute

Note: This table provides the definitions and sources of variables used in this study.

over the sample period. Fig. 3 shows a significant increase in dividends paid by banks in the second half of the 1990s. After a pause from 2000 to 2002, the increase in dividends continues until 2005, the end of our sample period.

Table 2 presents summary statistics of the variables used in the empirical analysis. The average value of the change in dividends is 0.61% in line with the upward trend in dividends depicted in Fig. 1. Moreover, the large dispersion in the change in dividends variable documented in Table 2 suggests a prominent difference in dividend payouts across banks. The average values of the competition variables *DREG* and *Weighted DREG* are about equal to 1.5. The similar values of *DREG* and *Weighted DREG* imply that banks face similar competition within and outside their home state.

3. Empirical results

3.1. Baseline results

Table 3 presents the results of estimating Equation (1) using the change in bank dividends as the dependent variable. Column 1 presents results using *DREG* as the main explanatory variable. The coefficient on *DREG* enters the regression negatively, and is statistically significant at the 1% level, suggesting a negative relationship between competition and dividends. This is in line with prior evidence relating to non-financial firms (Hoberg et al., 2014). *DREG* is also economically

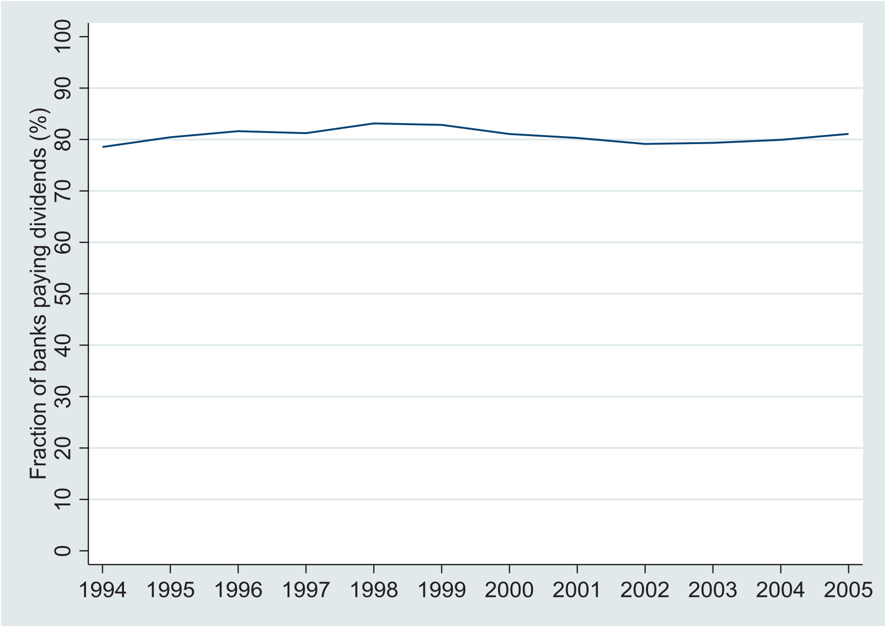

Fig. 2. Fraction of banks paying dividends. Note: This figure presents the fraction of banks that pay dividends in our sample for the period from 1994 until 2005.

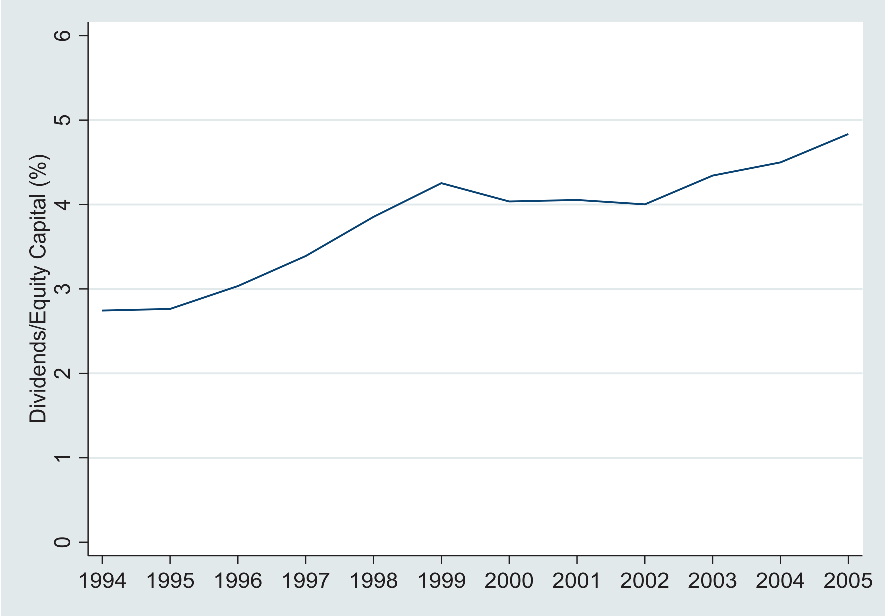

Fig. 3. Dividends as share of equity capital. Note: This figure presents the evolution of dividends paid by banks in our sample as a share of their equity capital over the period from 1994 until 2005.

significant; banks located in states where competition is intense (where *DREG* equals 4) reduce dividends by 0.25% (=-0.063 $\times$ 4) relative to banks located in states where competition is mild (where DREG equals 0). This represents a large reduction relative to the unconditional mean of dividend change, which is equal to 0.61%.

Next, we investigate whether the prevailing market structure in each state, when the IBBEA was enacted, moderates the impact of deregulation on dividends. That is, we explore whether at the point when states began removing barriers to out-of-state bank entry and competition intensified, banks operating in states with lower market concentration reduced their dividends at a different rate relative to counterparts in states with higher market concentration. In order to do so, we interact

Table 2
Summary statistics.

	N	Mean	Std. Dev.	Median
Change in Dividends	16,188	0.614	2.269	0.195
DREG	16,188	1.509	1.479	1.000
Weighted DREG	16,188	1.503	1.455	1.000
Size	16,188	13.159	1.204	12.786
Profitability	16,188	0.011	0.005	0.011
Liquidity	16,188	0.044	0.023	0.038
Capitalization	16,188	0.091	0.027	0.088
Risk	16,188	0.709	0.819	0.465
HHI	16,188	606.169	421.846	549.209
Sup Leniency	15,704	0.097	0.046	0.094
Expected Profitability	16,188	0.565	0.496	1.000
HCLG	16,188	0.267	0.442	0.000
Wages	16,188	0.438	0.496	0.000
Overhead Costs	16.188	0.413	0.492	0.000
Peer	16,180	0.612	0.476	0.578
PCA	16,188	0.009	0.098	0.000
Tax	16,188	0.068	0.029	0.073
SOX	16,188	0.081	0.273	0.000
Log GSP	16,188	12.352	0.941	12.409
Coincident Index	16,188	87.962	6.824	89.170
Freedom Index	16,188	6.069	0.893	6.189

Note: This table presents the summary statistics of the 16,188 observations of 2,563 US bank holding companies in our sample from 1994 to 2005. The definitions and sources of the variables are given in Table 1.

Table 3
Competition and bank dividend policy: Baseline results.

	Dependent variable: Change in dividends			
	DREG	Initial market structure conditions	Supervisory leniency	Decomposed DREG
	(1)	(2)	(3)	(4)
$DREG_{s,t-1}$	−0.063***	−0.061***	−0.128***	
	(0.017)	(0.016)	(0.019)	
$DREG_{s,t-1}$ * $HHI_{s,t-1}$		−0.241		
		(0.755)		
DREG $_{s,t-1}$ * Sup $Leniency_s$			0.064***	
			(0.019)	
Minimum $Age_{s,t-1}$				−0.064
				(0.062)
De $Novo_{s,t-1}$				−0.202**
				(0.095)
$Acquisition_{s,t-1}$				0.152
				(0.092)
Deposit $Cap_{s,t-1}$				−0.199**
				(0.079)
$Size_{i,t-1}$	0.067	0.069	0.065	0.063
	(0.163)	(0.164)	(0.168)	(0.162)
$Profitability_{i,t-1}$	−15.165	−15.175	−14.375	−15.022
	(11.259)	(11.259)	(11.786)	(11.204)
$Liquidity_{i,t-1}$	1.686	1.688	2.284	1.670
	(2.136)	(2.136)	(2.127)	(2.148)
$Capitalization_{i,t-1}$	15.242***	15.251***	15.134***	15.273***
	(3.303)	(3.306)	(3.381)	(3.287)
$Risk_{i,t-1}$	−0.080*	−0.081*	−0.074*	−0.079*
	(0.042)	(0.042)	(0.043)	(0.042)
Bank fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
No. of Observations	16,188	16,188	15,701	16,188
R-squared	0.149	0.149	0.146	0.149

Note: This table presents the baseline results. The dependent variable is dividend change. In column 1 DREG is the variable of interest, which takes the value of 0 (most restricted) to 4 (least restricted). In column 2, we interact DREG with the (demeaned) Herfindahl Hirschman Index for deposits as of 1993 to investigate the influence of initial market structure conditions in conjunction with DREG on dividends. In column 3, we interact DREG with a dummy variable taking value of one for positive values of Sup Leniency (a measure of supervisory leniency across US states), otherwise assuming the value of zero, to investigate the moderating effect of supervisors on the impact of competition on dividends. In column 4, the components of DREG (Minimum Age, De Novo, Acquisition, and Deposit Cap) are included in the regression. The control variables include size, profitability, liquidity, capitalization, and risk. The definitions of these variables are provided in Section 3.3. Standard errors are clustered at the state level and shown in parentheses. *,**, and *** denote significance level at 10%, 5%, and 1%, respectively.

concentration (measured by the demeaned Herfindahl-Hirschman Index for deposits in 1993 at the state level) with *DREG* and incorporate this term in Equation (1). The results are presented in column 2. Although the coefficient on *DREG* is similar to column 1 in terms of significance and magnitude, the coefficient on the interaction term is statistically insignificant. This suggests that initial market structure conditions do not play any role in moderating the effect of deregulation (following the passage of the IBBEA) on bank dividends.

In a further step, we investigate whether supervisory scrutiny at state level moderates the effect of competition on bank dividend policy. Recent evidence suggests that the leniency of state bank supervision varies across states (Agarwal et al., 2014). Lenient state supervisors may be slow to take corrective action against financially troubled banks. Consequently, lenient supervisors may allow potentially troubled banks to maintain current levels of dividend payment despite increases in competitive pressure following deregulation. We employ a measure of supervisory leniency at the state level (Agarwal et al, 2014). State and federal supervisors assign ratings based on assessments of safety and soundness of banks. Using a proprietary database containing such aforementioned ratings, Agarwal et al. (2014) estimate the differential leniency exhibited by state and federal regulators when assessing the same banks.[12] We define $Sup\ Leniency_s$ as a binary variable that takes the value of one if the Agarwal et al. (2014) measure takes positive values (which implies greater state supervisory leniency) and zero otherwise. Subsequently, we interact $Sup\ Leniency_s$ with $DREG_{s,t\text{-}1}$, and include it in Equation (1). The results are reported in column 3 of Table 4. As in column 1, the coefficient on $DREG_{s,t\text{-}1}$ enters negatively and significantly. The coefficient on the interaction term enters the regression positively and significantly. This suggests that in states with more lenient bank supervision, an increase in competition is associated with a smaller reduction in dividends.[13]

As the next step, we decompose the *DREG* index into its constituent components. The results, presented in column 4 suggest that the negative relationship between competition and dividends is driven by the increased competition induced by the removal of both the minimum age of target institution and the deposit cap restrictions. This finding is consistent with Johnson and Rice (2008), who find that the deposit cap restriction is a significant barrier to out-of-state bank entry.[14]

Turning to our control variables, the coefficient on bank capital is positive and significant confirming that better capitalized banks are able to undertake sizeable payouts. On the other hand, the coefficient on bank risk is found to be negatively correlated with dividends in a significant way. Bank size, profitability and liquidity variables are all insignificant. These results are compatible with findings of the previous literature (Abreu and Gulamhussen, 2013; Forti and Schiozer, 2015; Tripathy et al., 2021).

3.2. Testing the underlying mechanisms

The results of our empirical analysis (outlined in Section 3.1) suggest that competition has a significant impact on bank dividends. In this section, we draw on insights provided by prior literature to investigate the extent to which bank profitability and free cash flow affect bank dividends across states characterized by low and high levels of competition.

3.2.1. Competition, bank profitability, and dividends

Entry and increased competition are likely to lead to reductions in the future cash flows accruing to incumbent banks and affect dividends paid to shareholders. If competition affects dividends via a decline in profitability, then any resultant impact of competition on dividends should be smaller among banks with higher expected profitability.

In order to test this proposition, we augment Equation (1) with an interaction term between $DREG_{s,t\text{-}1}$ and $Expected\ Profitability_{i,t}$. *Expected Profitability* is a dummy variable that captures managerial expectations of future profitability. According to prior literature discretionary loan loss provisions signal private managerial information regarding future earnings. Bank managers are inclined to accept reduced current earnings (in the form of increased loan loss provisions), when future earnings prospects are positive (Beaver et al., 1989; Lobo and Yang, 2001). Therefore, an increase in the discretionary component of provisions indicates an increase in future bank cash flows (Wahlen, 1994; Liu, Ryan and Wahlen, 1997; Gibson, 2000). In the spirit of Wahlen (1994), we estimate the following loan loss provisioning model:

$$LLP_{i,t} = \sum_{j=0}^{2} \left(\beta_{1j} Loans_{i,t-j}\right) + \sum_{j=1}^{2} \left(\beta_{2j} NPL_{i,t-j} + \beta_{3j} LLR_{i,t-j}\right) + \beta_4 E\Delta NPL_{i,t} + \gamma_t + \varepsilon_{i,t} \quad (2)$$

$LLP_{i,t}$ denotes loan loss provisions. $Loans_{i,t-j}$ denotes the dollar amount of total loans granted. $NPL_{i,t-j}$ and $LLR_{i,t-j}$ denote non-performing loans and allowances for loan losses, respectively. $E\Delta NPL$ is the predicted value of the growth of non-performing loans derived from an autoregressive model of the growth of non-performing loans augmented with the amount of outstanding loans granted by the bank lagged up to two years. Finally, γ_t denotes year fixed effects, and $\varepsilon_{i,t}$ is the error

[12] The US banking system operates under a dual state and federal system of chartering and bank soundness regulation (Spong, 2000). According to the law, supervisors assigned to state-chartered banks alternate between state and federal at predetermined time intervals. Bank supervisors conduct on-site safety and soundness examinations which result in the assignment of CAMELS ratings. Agarwal et al. (2014) rely on the CAMELS ratings produced by the rotating regulators (for the same bank) to identify inconsistencies in the regulatory process. They provide evidence of heterogeneous implementation of the same set of rules by different state regulators when benchmarked against the same federal regulator.

[13] This finding is robust to the use of an alternative measure of the intensity of supervisory scrutiny due to Hirtle et al. (2020).

[14] Prior evidence suggests that out of state banks cannot easily circumvent this restriction (Nguyen et al. 2017). Consequently, any removal would increase competition.

Table 4
Testing the mechanisms: Profitability and agency costs channels.

	Dependent variable: Change in dividends			
	Profitability	Free cash flow	Quiet life	
	(1)	(2)	(3)	(4)
$DREG_{s,t-1}$	−0.100***	−0.066***	−0.069***	−0.068***
	(0.019)	(0.021)	(0.018)	(0.021)
$DREG_{s,t-1}$ * Expected $Profitability_{i,t}$	0.087***			
	(0.031)			
Expected $Profitability_{i,t}$	−0.010			
	(0.068)			
$DREG_{s,t-1}$ * $HCLG_{i,t-1}$	0.008			
	(0.029)			
$HCLG_{i,t-1}$	−0.043			
	(0.096)			
$DREG_{s,t-1}$ * $Wages_{i,t-1}$	0.023			
	(0.032)			
$Wages_{i,t-1}$	−0.107			
	(0.094)			
$DREG_{s,t-1}$ * Overhead $Costs_{i,t-1}$	0.013			
	(0.027)			
Overhead $Costs_{i,t-1}$	−0.099			
	(0.092)			
Bank controls	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
No. of Observations	16,188	16,188	16,188	16,188
R-squared	0.149	0.149	0.149	0.149

Note: This table presents the results of the mechanism analyses: profitability channel (column 1), agency cost of free cash flow channel (column 2), agency cost of managerial slack (columns 3 and 4). In column 1, we interact DREG with the Expected Profitability, a proxy for management expectation of future earnings. In column 2, we interact the DREG with HCLG, an indicator variable that takes the value of one if banks have high cash flow and low growth opportunities, and zero otherwise, which indicates the agency cost of free cash flow problem. We use the ratio of operating income to total assets and asset growth as proxies for cash flow and growth opportunities, respectively. In column 3 we interact DREG with Wages, an indicator variable that takes the value of one if banks pay wages above the sample's mean value, and zero otherwise. In column 4 we interact DREG with Overhead Costs, an indicator variable that equals one if banks have overheads above the sample's mean value and zero otherwise. All models are estimated using OLS with bank and year fixed effects. Bank level control variables are included but they are not reported for brevity. Standard errors are clustered at the state level and shown in parentheses. *,**, and *** denote significance level at 10%, 5%, and 1%, respectively.

term. The residuals of Equation (2) serve as a proxy for the discretionary component of loan loss provisions (Wahlen, 1994; Liu, et al., 1997). We set *Expected Profitability* equal to one if the discretionary component of loan loss provisions is positive and zero otherwise. A priori we expect a positive coefficient on this interaction term.

The results of this analysis are presented in column 1 of Table 4. The estimated coefficient on the interaction term between $DREG_{s,t-1}$ and current expectations of future bank profitability (*Expected* $Profitability_{i,t}$) is positive and statistically significant at the 1% level. These results suggest that competition has less impact on the dividends of banks with higher expected profitability.

In order to provide further evidence in support of this channel, we examine how bank profitability responds to increased competition. We re-estimate Equation (1) after replacing the dependent variable with return on assets (a direct proxy for realized profitability). We repeat this analysis five separate times in order to account for various time horizons from the moment there is a change in the competitive environment facing banks. The results are tabulated in Table A1 of the Appendix. The coefficients on $DREG_{s,t-1}$ suggest that banks facing more competition experience a decline in profitability, albeit any negative impact becomes significant with a lag. These findings further support the notion that the expected decline in profitability (in response to changes in the competition) leads banks to reduce dividends.

3.2.2. Competition, agency costs, and dividends

Competition can reduce the dividends paid to shareholders via an alternative agency cost mechanism. Prior studies suggest that in order to attract and retain investors, firms signal efficient cash flow management by paying high dividends (Easterbrook, 1984; Grullon et al., 2019). That is, dividends reduce agency conflicts between managers and shareholders by limiting the ability of managers to channel unused resources away from shareholders. As a consequence, firms (especially those with substantial free cash flow) paying low dividends are likely to be regarded less favorably by investors (Jensen, 1986). However, an increase in the degree of competition facing firms can also serve as a powerful tool to mitigate agency conflicts within the firm (Hart, 1983; Schmidt, 1997; Allen and Gale, 2000). Increased competition can induce a more efficient cash flow management resulting in firms paying lower dividends. Therefore, if competition affects dividends via a decline in agency conflicts at the firm, then any resultant impact of competition on dividends should be higher among banks with higher agency problems due to free cash flow.

In order to test this proposition, we follow Lang et al. (1991) and classify banks into groups based on operating cash flows relative to growth prospects, measured by the ratio of operating income to total assets and asset growth respectively.[15] Banks with high cash flow (above the median value for the sample) and low growth prospects (asset growth less than the median value for the sample) are more likely to face free cash flow problems. Therefore, in Equation (1) we include $HCLG_{i,t-1}$, which takes the value of one if a bank is likely to face free cash flow problems and zero otherwise, together with its interaction with $DREG_{s,t-1}$. The results, reported in column 2 of Table 4 indicate that the interaction between $DREG_{s,t-1}$ and $HCLG_{i,t-1}$ enters the regression with a negative albeit insignificant coefficient. This suggests that when competition increases, banks facing agency issues arising from high free cash flow do not change dividends in a way that is systematically different to counterparts not encountering such agency issues.

We also investigate whether competition affects dividends by reducing managerial preferences for a "quiet life" (Bertrand and Mullainathan, 2003; Giroud and Mueller, 2010). That is, as competition intensifies, managerial discipline improves, thus reducing the pressure on managers to demonstrate commitment to shareholder interests through dividend payments. Therefore, we would expect the impact of competition on dividends to be higher among banks with higher agency problems due to managerial slack. To test this proposition (and following Giroud and Mueller, 2010), we use wages and overhead costs as proxies for managerial "quiet life". We classify banks into groups based on whether they have high or low levels of salary and overhead expenses which are defined as the ratio of personnel expenses to the number of employees and the ratio of non-interest expenses to total assets, respectively. Banks with high *Wages* or *Overhead Costs* are more likely to have greater managerial slack. Columns 3 and 4 of Table 4, present the results of estimating Equation (1) augmented with these dummy variables, together with their respective interaction with *DREG*. *Wages* (*Overhead Costs*) takes a value of one if a bank's salary expenses ratio (overhead expenses ratio) are above the sample mean value and zero otherwise. The interaction terms ($DREG_{s,t-1} \times Wages_{i,t-1}$ and $DREG_{s,t-1} \times Overhead\ Costs_{i,t-1}$) enter the regression with statistically insignificant coefficients. This suggests that when faced with increased competition, banks facing agency issues due to managerial slack do not change their dividend policy in a systematic way.

4. Additional tests

4.1. Other determinants of dividends

In this section we investigate the robustness of our main findings to the inclusion of additional determinants of dividends. These include peer-effects, regulatory pressure, taxation, and external corporate governance regulations.

Peer Effects

First, we investigate whether peer-effects could act as a potential confounder to our findings. Prior literature suggests that firm behavior can be influenced by the various policy choices of industry peers including: capital structure (Leary and Roberts, 2014); capital investments and research and development (Patnam, 2011) and dividends (Adhikari and Agrawal, 2018; Grennan, 2019). To alleviate concerns that our findings could be driven by peer effects, we re-estimate Equation (1) by incorporating a measure of peer influence at state level. We define peer banks as those banks that operate in the same state. Following Adhikari and Agrawal (2018), we measure peer influence on bank dividend policy at the state level by $Peer_{-i,s,t}$ which is the average dividend change of all banks in state *s* except bank *i* in year t. The results, which are tabulated in column 1 of Table 5, show that the coefficient on the peer effect variable $Peer_{-i,s,t}$ is not statistically significant, whereas the $DREG_{s,t-1}$ remains negative and significant at the 1%. These results suggest that peer effects do not drive our main findings.

Regulatory Pressure

Next, we investigate the impact of regulatory pressure on bank dividend policy. Undercapitalized banks could be forced by regulators to retain earnings rather than pay dividends (Abreu and Gulamhussen, 2013). Following Abreu and Gulamhussen (2013) we construct a prompt corrective action indicator, *PCA,* which takes the value of one if: a bank's total risk-based capital ratio falls below 8%; its tier 1 risk-based capital ratio falls below 4%; or its tier 1 leverage ratio falls below 4%.[16] In column 2 of Table 5, we include *PCA* in Equation (1) and re-estimate the model. Our main findings remain robust to the inclusion of the *PCA* variable.

[15] These findings are robust to the use of Tobin's Q and the Market to Book ratio as a proxy for investment opportunities. The use of market prices to calculate investment opportunities limits our sample to publicly listed banks only.

[16] Section 38 of the Federal Deposit Insurance Act requires regulators to categorize banks into five categories based on: total risk-based capital ratio; tier 1 risk-based capital ratio; and a leverage ratio. A bank must significantly exceed the minimum standard for all three capital measures. Banks classified as well capitalized are not subject to supervisory interference. Banks failing to meet the minimum thresholds for capital adequacy are subject to increasingly stringent supervisory actions the further capital ratios deteriorate below regulatory thresholds. These include: annual earnings retentions; lending restrictions; and the submission and adherence to a capital restoration plan.

Table 5
Other known determinants of dividend policy.

	Dependent variable: Change in dividends			
	(1)	(2)	(3)	(4)
$DREG_{s,t-1}$	−0.063***	−0.063***	−0.062***	−0.063***
	(0.018)	(0.017)	(0.017)	(0.017)
$Peer_{i,t}$	−0.001			
	(0.063)			
$PCA_{i,t}$		−0.277		
		(0.434)		
$Tax_{s,t}$			3.876	
			(6.300)	
$SOX_{i,t}$				−0.050
				(0.070)
Bank controls	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
No. of Observations	16,180	16,188	16,188	16,188
R-squared	0.149	0.149	0.149	0.149

Note: This table presents the results of robustness checks of our baseline estimation. Column 1 includes the variable Peer to consider the peer effects on banks dividend policy. Peer is defined as the average dividend change of all banks in state *s* except bank *i* in year t. Column 2 *PCA* takes a value of one if: a bank's total risk-based capital ratio falls below 8%; its tier 1 risk-based capital ratio falls below 4%; or its tier 1 leverage ratio falls below 4%. Column 3 accounts for state level marginal corporate income tax rates. Column 4 focuses on the Sarbanes-Oxley Act of 2002. To account for governance mechanisms externally imposed on publicly listed banks during the period of our analysis the specification includes SOX, a binary variable equal to one for publicly listed banks after the implementation of the Act and zero otherwise. All model specifications are estimated using OLS with bank and year fixed effects. Standard errors are shown in parentheses and are clustered at the state level. *,**, and *** denote significance level at 10%, 5%, and 1%, respectively.

Taxes

We also investigate the impact of taxes on bank dividend policy. Any changes in the dividend tax rate or the federal corporate income tax rate facing banks during the period of analysis would induce banks to adjust dividends in a similar manner around the same time. Such variation is absorbed by time fixed effects, which are included in Equation (1). However, corporate income tax rates at the state level are likely to change in a staggered manner. If this change was to happen in tandem with changes in out-of-state bank entry barriers, then it could act as a confounding factor to our findings. To alleviate such concerns, column 3 of Table 5 augments Equation (1) with *Tax*, a variable that captures the marginal corporate income tax rate at the state level. Our findings remain unaltered.

Corporate Governance Regulation

Finally, we also consider that the results of our analysis could be confounded by external corporate governance regulations that became effective during our sample period. We turn our attention to the Sarbanes-Oxley Act of 2002, which placed additional corporate governance requirements on the boards of all publicly listed firms including banks (Adams and Mehran, 2008; Macey and O'Hara, 2016). In particular, the Sarbanes-Oxley Act requires boards of publicly traded firms to have a majority of independent directors and mandates the existence of three board committees, namely audit, nominating, and compensation. Such changes, which aim to strengthen board independence to better monitor managerial behavior, could substitute for the monitoring role of dividends and thus result in dividend reductions (John et al, 2015; La Porta et al., 2000). One could argue that these externally implemented constraints on the board of publicly listed banks have influenced dividend policy in a similar fashion to that observed for geographic deregulation. To alleviate such concerns, we account directly for the impact of the Sarbanes-Oxley Act in our analysis. We include a binary variable, SOX in Equation (1), which takes a value of one for all publicly listed banks after the implementation of the Sarbanes-Oxley Act and zero otherwise. The results presented in column 4 of Table 5 suggest that the effect of *DREG* on bank dividend policy is robust to the introduction of the Sarbanes-Oxley Act in 2002.

4.2. Sensitivity checks

The main results obtained in Section 3.1 support the notion that competition reduces bank dividends. This section provides several sensitivity checks of our main findings in relation to: model specification and estimated standard errors; competition measurement and sample composition; and dividend policy measures.

Model specification and standard errors.

Table 6 tabulates the results of sensitivity checks that involve various model specifications and different methods for clustering standard errors. In column 1, we replace bank fixed effects with state fixed effects (to control for time-invariant unobserved state characteristics) in the main specification. In column 2, we retain the bank fixed effects and add state-time trends

Table 6
Sensitivity checks: model specification and standard errors.

	Dependent variable: Change in dividends							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DREG	−0.072***	−0.074***	−0.075***	−0.068***	−0.063*	−0.063***	−0.063**	−0.063**
	(0.017)	(0.020)	(0.017)	(0.018)	(0.030)	(0.022)	(0.025)	(0.023)
Log GSP			−0.130					
			(0.283)					
Coincident Index			0.034**					
			(0.013)					
Freedom Index			0.104					
			(0.109)					
Bank controls	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Bank fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	No	No	No	No	No	No	No
State-time trends	No	Yes	No	No	No	No	No	No
No. of Observations	16,188	16,188	16,188	16,188	16,188	16,188	16,188	16,188
R-squared	0.024	0.151	0.149	0.143	0.149	0.149	0.149	0.149

Note: This table presents the results of sensitivity checks of our baseline estimation with respect to different model specifications and clustering of standard errors. In column 1, we include year and state fixed effects while in column 2, we include state-time trends to control for pre-trends in our data. In column 3 we include three state level time varying control variables (Log GSP, Coincident Index, and Freedom Index). In column 4 we exclude the time varying bank level control variables from the model. In columns 5, 6, 7 and 8, we cluster the standard errors at year, bank, state-by-year and at both state and year levels, respectively. All model specifications are estimated using OLS. Bank level control variables are included in all columns (except column 4) but they are not reported for brevity. Standard errors are shown in parentheses and are clustered at the state level in all models unless explicitly stated otherwise. *,**, and *** denote significance level at 10%, 5%, and 1%, respectively.

in order to control for any pre-trends in our data set. In column 3, we include three additional state level time-varying variables to control for the economic environment, which could potentially be correlated with the timing of deregulation in a given state. These variables are the natural logarithm of the Gross State Product (*Log GSP*), the *Coincident Index*, and the *Freedom Index*. The results of re-estimating our main model incorporating these changes are consistent with the findings reported in Table 3.

A key condition for drawing causal inferences is the random assignment of interstate branching laws across states. If treatment is to be assumed as good as random, the magnitude of the difference-in-differences coefficient should remain unaffected by the inclusion of control variables (Roberts and Whited, 2013). Therefore, we re-estimate our baseline model in column 4 excluding the time-varying bank specific controls. We find that the magnitude of the coefficient of interest remains similar compared to baseline case. The fact that the coefficient of interest remains stable across different specifications suggests that the effect of (deregulation induced) competition on bank dividend policy is not driven by unobservables. Nevertheless, we statistically evaluate the scope for omitted variable bias in our findings by conducting Oster's (2019) coefficient stability test. This test is based upon the assumption that selection on observables is proportional to selection on unobservables.[17] We set $R_{max} = 1.3 * \bar{R}$ and obtain $(-0.432, -0.063)$ as a bound for the effect of deregulation induced competition on bank dividend policy. Given that the estimated interval does not contain zero, it suggests that the coefficient on *DREG* is unlikely to be confounded by selection on unobservables.

In the baseline model we cluster standard errors at the state level to allow for any correlation among banks located within a state. In columns 5, 6, 7 and 8 of Table 6, we re-estimate the Equation (1) by clustering at year, bank, state-by-year, and at both state and year levels (Krishnan et al., 2014). The main conclusions remain unchanged.

Competition measurement and sample composition.

We investigate whether our findings are sensitive to the inclusion of banks in our sample that have presence in multiple states, and thus are likely to be exposed to changes in competition outside of the state where they are headquartered. In column 1 of Table 7, we replace our main independent variable (*DREG*) with *Weighted DREG* (Berger et al., 2022). Using deposit market share data obtained from FDIC Summary of Deposit (SOD) database, we weight *DREG* based on the share of deposits that banks have in all states where they have presence. The *Weighted DREG* accounts for the fact that a number of banks do not only operate in their home state (the state where they are headquartered), but also have branches or subsidiaries in other states. Therefore, changes in the interstate branching regulation in states where a bank has presence other

[17] Oster (2019) shows that, if selection on observables is perfectly proportional to selection on unobservables, the upper bound, $\bar{\beta}$, is equal to the coefficient on *DREG* when a full set of (observable) controls is included in Equation (1). The lower bound, $\underline{\beta}$, is equal to $\bar{\beta} - \left(\hat{\beta} - \bar{\beta}\right)\left[\left(R_{max} - \bar{R}\right) / \left(\bar{R} - \hat{R}\right)\right]$. $\hat{\beta}$ is the coefficient on *DREG* when no time varying controls other than the treatment are included in the model specification. $\bar{R}$ and $\hat{R}$ denote the respective R^2 in the two regression specifications, while R_{max} is the R^2 in a hypothetical regression when all (observable and unobservable) variables are controlled for.

Table 7
Sensitivity checks: competition measurement & sample composition.

	Dependent variable: Change in dividends							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$DREG_{s,t-1}$		−0.038*		−0.050*	−0.057**	−0.059***	−0.059***	−0.063***
		(0.019)		(0.025)	(0.026)	(0.020)	(0.018)	(0.017)
Weighted $DREG_{s,t-1}$	−0.057***							
	(0.018)							
$DREGbinary_{s,t-1}$			−0.159**					
			(0.059)					
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of Observations	15,605	12,077	16,188	4648	11,490	14,331	14,680	16,016
R-squared	0.140	0.150	0.149	0.226	0.147	0.147	0.151	0.149

Note: This table presents the results of sensitivity checks of our baseline estimation with respect to competition measurement and sample composition. In column 1, we use an alternative proxy of competition, which is Weighted DREG. We weight the original DREG with the state level deposits of BHC operations in all states. In column 2, we restrict our sample to only banks that operate in a single state where they are headquartered. In column 3, we use a binary variable as a proxy of competition. We define DREGbinary as a binary variable that takes the value of one if a state lifts (or never imposes) restrictions on either the acquisition of individual bank branches (Acquisition) or on a state-wide deposit cap (Deposit Cap), otherwise the variable assumes the value of zero. In column 4, we restrict our sample to publicly owned banks, while in column 5, we restrict our sample to privately owned banks. Column 6 excludes banks incorporated in Georgia, Pennsylvania and Virginia as these states passed poison pill laws during the period of investigation. Column 7 excludes banks incorporated in Iowa and Texas as these two states passed business combination laws during the period of investigation. Column 8 excludes banks in South Dakota and Delaware as these two states have very liberal banking rules. All model specifications are estimated using OLS with bank and year fixed effects. Bank level control variables are included in all columns but they are not reported for brevity. Standard errors are shown in parentheses and are clustered at the state level. *,**, and *** denote significance level at 10%, 5%, and 1%, respectively.

than the state where headquarters are located may also affect dividend policy. The results (which are consistent with the main results presented in Table 3) suggest that the *Weighted DREG* negatively affects bank dividends. We further corroborate our findings by re-estimating Equation (1) using a restricted sample containing banks that operate in a single state. As such these banks are only exposed to changes in the competitive environment within the state they are headquartered. The results which are reported in column 2 of Table 7, are in line with the main results.

We also investigate whether our findings are sensitive to the way the measure of competition is defined. Following prior empirical research (Nguyen et al., 2018; Berger et al., 2022) we codify (deregulation induced) competition as a binary variable. Specifically, and in line with Nguyen et al. (2018) we define $DREGbinary_{s,t-1}$ as a variable that takes the value of one if a state lifts (or never imposes) restrictions on either the acquisition of individual bank branches (Acquisition) or on a state-wide deposit cap (Deposit Cap), otherwise the variable assumes the value of zero. Johnson and Rice (2008) and Nguyen et al. (2018) argue that these two restrictions are the most difficult to be circumvented by out-of-state banks trying to enter into a new market. Subsequently, we replace $DREG_{s,t-1}$ with $DREGbinary_{s,t-1}$ and re-estimate Equation (1). The results, which are reported in column 3 of Table 7 support our main findings.

A potential concern is that our results could be biased by the ownership structure of the banks included in our sample. Prior literature finds that public and private non-financial firms exhibit different dividend behaviours (Michaely and Roberts, 2012). The difference in the ownership structure of banks could also shape their dividend policy in the face of increased competition. To alleviate such concern, we split the sample into private and publicly owned banks and re-estimate Equation (1) separately for each restricted sample. The results of these analyses, which are presented in columns (4) and (5) of Table 7 for publicly and privately owned banks respectively, suggest that the effect of competition on bank dividend policy does not depend on the type of ownership structure of banks.

Another potential concern is that our results could be influenced by state level takeover laws enacted at the same time as the state level bank deregulation. In order to address this concern, we collect information on the passage of the Poison Pill and Business Combination anti-takeover statutes (Cain et al., 2017).[18] During our sample period three states (Georgia, Pennsylvania and Virginia) passed Poison Pill laws, while two states (Iowa and Texas) passed Business Combination laws. In this context, we exclude banks incorporated in these aforementioned states and re-estimate Equation (1). The results, presented in columns 6 and 7 of Table 7, are consistent with our main findings. Moreover, following Berger et al. (2022), we re-estimate our baseline model excluding banks located in South Dakota and Delaware (two states with very liberal banking rules). The results, which are reported in column 8 of Table 7, are in line with our main findings.

Alternative measures of dividend payout.

Finally, we investigate the sensitivity of our findings to alternative measures of bank dividends. Following prior literature (Becker-Blease, 2011; Fang et al., 2014; Huang et al., 2016; Agrawal and Cooper, 2015 among others), we employ the natural logarithm of dividend-to-equity ratio and the natural logarithm of the dividend-to-assets ratio (expressed in percentages) as

[18] Both statutes are state-law arrangements regulating tender offers. With the passage of the business combination statute, corporates that had recently been acquired were prohibited from engaging in a business combination. The poison pill statute authorized corporates to adopt anti-take-over defenses.

Table 8
Sensitivity checks: alternative measures of dividend payout.

Dependent variable:	Dividends to equity ratio	Dividends toassets ratio	Dividends to equity ratio	Dividends toassets ratio
	(1)	(2)	(3)	(4)
DREG	−0.111**	−0.114**	−0.119***	−0.011**
	(0.044)	(0.044)	(0.046)	(0.005)
Bank controls	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Log transformation	Yes	Yes	No	No
Estimation method	OLS	OLS	Tobit	Tobit
No. of Observations	16,188	16,188	16,188	16,188
R-squared	0.822	0.827		

Note: This table reports the results of sensitivity checks of our baseline estimation with respect to alternative measures of dividend payout. In columns 1 and 2, the dependent variables are logarithmic transformation of dividends to equity and dividends to assets ratio, respectively. In columns 3 and 4, the dependent variables are dividends to equity and dividends to assets ratio, respectively. The first two model specifications are estimated with OLS with bank and year fixed effects, while we utilize fixed effects tobit estimation method of Honoré (1992) in columns 3 and 4. Bank level control variables are included in all columns, but they are not reported for brevity. In columns 1 and 2, standard errors are shown in parentheses and are clustered at the state level, while bootstrapped standard errors are employed in columns 3 and 4. *,**, and *** denote significance level at 10%, 5%, and 1%, respectively.

dependent variables and re-estimate Equation (1) using OLS. In our estimations we use all available information on the levels of dividends.[19] Columns 1 and 2 of Table 8 show that the coefficient on *DREG* remains significantly and negatively associated with these alternative measures of bank dividend policy.

Following prior literature (Arena and Kutner, 2015; Johari et al., 2020), we also re-estimate Equation (1) with the two aforementioned dividend ratios (without transformation) as dependent variables using a censored normal regression Tobit model with fixed effects (Honoré, 1992). This estimator takes into consideration the bounded support from below of these two dividend ratios, and provides consistent and asymptotically normal estimates of the model parameters in the presence of bank fixed effects. Columns 3 and 4 of Table 8 further document that bank dividends are negatively and significantly related to intensified competition. Collectively, these results corroborate that our main findings are not driven by the choice of dividend measure.

4.3. Falsification tests

A key identification assumption behind the difference-in-differences approach is that in the absence of treatment, changes in the magnitude of dividends for both treated and control banks demonstrate similar trends, commonly referred to as the parallel trend assumption (Abadie, 2005). We conduct a placebo test in order to alleviate concerns regarding violations of the parallel trend assumption. Following established practice (Bertrand and Mullainathan, 2004; Krishnan et al., 2014; Berger et al., 2022, among others), we re-estimate Equation (1) including a *Before (3,1)* dummy that equals one in the three years prior to the interstate bank branching deregulation in the state, and zero otherwise. The results are reported in column 1 of Table 9. We find that the coefficient on the *Before (3,1)* dummy is not statistically significant. This suggests that the parallel trend assumption for the pre-treatment period is not violated. As such this finding alleviates concerns that our main findings reported in Table 3 are driven by secular trends or reverse causality.

Next, we investigate the concern that changes in bank dividends might be caused by an omitted variable rather than by the branching deregulation process. If that were the case, our findings would not support a causal interpretation (but rather a mere correlation) of the estimated relationship between competition and dividends. Given that our identification strategy relies on different states erecting barriers to bank branching at different points in time, an omitted variable would have to fluctuate every time a deregulatory event takes place for it to drive our results. The likelihood of such unobserved events coinciding with the deregulation process given its staggered nature is very small. As such, our strategy ameliorates the omitted variables concern. Moreover, Oster's (2019) coefficient stability test (reported in Section 4.2) further suggests that our findings are not driven by an omitted variable bias. Nevertheless, (and following Berger et al., 2022), we conduct two placebo tests and a contiguous county level analysis to further address this concern. The first placebo test assigns *DREG* values to states in a random manner, while maintaining the original empirical distribution of the *DREG* variable. The second placebo test randomly assigns states to each of the deregulation years with their corresponding *DREG* values. The results are reported in columns 2 and 3 of Table 9, respectively. None of the coefficients on *Placebo DREG* are statistically significant. Next, we restrict our sample to those banks located in contiguous counties separated by state borders. Contiguous counties are more likely to share similar characteristics (Huang, 2008). Consequently, an analysis based on contiguous counties, is likely to address any omitted variable bias associated with these characteristics. We re-estimate Equation (1) using this restricted sample. The results, which are presented in column 4 of Table 9, are consistent with our main findings. This suggests that

[19] To avoid losing bank-year observations when these ratios equal to zero, we add a small constant to the actual values when calculating the natural logarithm. We utilize the half of the minimum values for dividends-to-equity and dividends-to-assets ratios to come up with added constant values, respectively.

Table 9
Falsification tests.

	Dependent variable: Change in dividends			
	(1)	(2)	(3)	(4)
DREG	−0.069***			−0.085**
	(0.022)			(0.037)
Before (3,1)	−0.041			
	(0.085)			
Placebo DREG		−0.004	0.015	
		(0.013)	(0.023)	
Bank controls	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
No. of Observations	16,188	16,188	16,188	6183
R-squared	0.149	0.148	0.148	0.155

Note: This table presents the results of falsification tests to check the "parallel trend" assumption in difference-in-differences approach. In column 1, we re-estimate our baseline model augmented with Before (3,1), a dummy variable that equals one in the three years prior to the actual deregulation, and zero otherwise. In column 2, we randomly assign DREG to the states in our sample. In column 3, we randomly assign states to DREG values while maintaining their original distribution. In column 4, we re-estimate our baseline model using a restricted sample of banks located in contiguous counties separated by state borderlines. All models are estimated using OLS with bank and year fixed effects. Bank level control variables are included but they are not reported for brevity. Standard errors are clustered at the state level (except for column 4, which are clustered at the state borderline level) and shown in parentheses. *, **, and *** denote significance level at 10%, 5%, and 1%, respectively.

Table 10
Alternative difference-in-differences estimator.

	Dependent variable: Change in dividends
$DREGbinary_{s,t-1}$	−0.175***
	(0.069)
Bank controls	Yes
Bank fixed effects	Yes
Year fixed effects	Yes
No. of Observations	6,898

Note: This table presents the causal effect of competition on bank dividend policy estimated with an imputation-based difference-in-differences estimator due to Borusyak, Jaravel and Spiess (2022). In this case, DREGbinary is used as a proxy of the competitive conditions across states. Bank level control variables are also included. Standard errors clustered at state level are shown in parentheses. *,**, and *** denote significance level at 10%, 5%, and 1%, respectively.

our results are unlikely to be driven by unobserved factors that largely coincide with the bank branching deregulation pattern. Taken together, the results from the falsification tests support a causal interpretation of the findings obtained from estimating Equation (1).

4.4. Alternative difference-in-differences estimators

Our empirical design is based on the fact that the timing of deregulation differs across individual states. A recent strand of the econometrics literature emphasizes the potential limitations of conventional two-way fixed effects estimator in the case of staggered treatment design (Callaway and Sant'Anna, 2021; Goodman-Bacon, 2021). The bias associated with staggered treatments stems from the fact that the two-way fixed effect estimator tends to utilize already treated units in the control group when estimating the average treatment effect on the treated. To alleviate concerns that our main findings are driven by this bias, we first employ the Borusyak et al. (2022) estimator. Given that this imputation-based efficient estimator can only accommodate binary treatments, we re-estimate Equation (1) after replacing $DREG_{s,t-1}$ with $DREGbinary_{s,t-1}$ to obtain the causal effect of competition on bank dividend policy. The results of this analysis, which are presented in Table 10 confirm our main findings. We further test the robustness of our findings with the use of the "DiD_L" estimator of de Chaisemartin and D'Haultfoeuille (2020).[20] Similar to the Borusyak et al. (2022) estimator, the "DiD L" estimator is unbiased under heterogeneous and dynamic treatment effects, but it also accommodates time-varying treatment intensity. As such, we can re-estimate Equation (1) without having to rely on a binary transformation of *DREG*, the competition index. The estimation results presented in Fig. 4 lend further support on the negative effect of competition on bank dividends.

[20] Our findings are also robust to the use of the Callaway and Sant'Anna (2021) doubly robust difference-in-difference estimator. However, the doubly robust estimator is more restrictive than that of Borusyak, et al. (2022) in that it requires a balanced panel dataset. As such we estimate Equation (1) using a restricted sample.

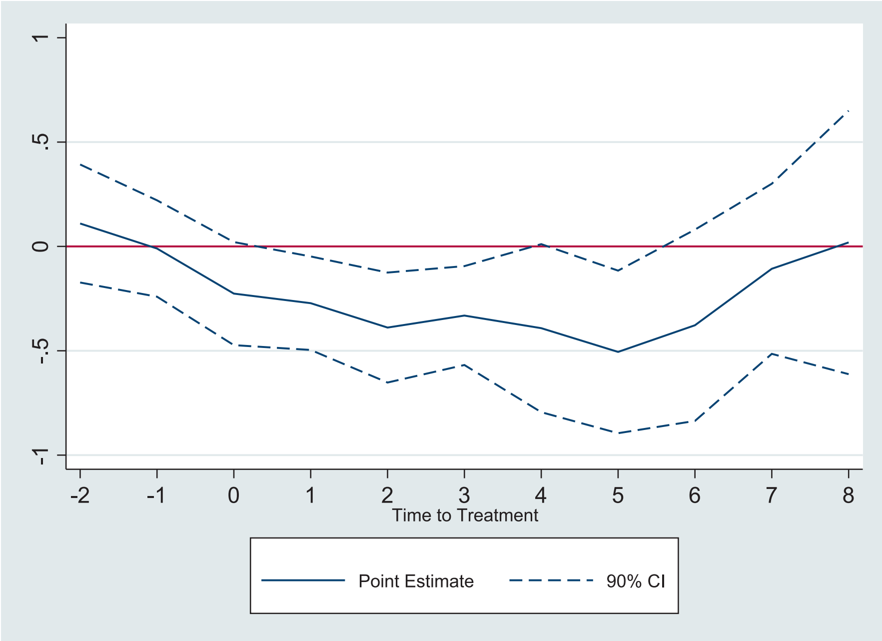

Fig. 4. de Chaisemartin and D'Haultfoeuille (2020) estimation results. Note: This figure presents the estimation results using the DiD_L estimator proposed by de Chaisemartin and D'Haultfoeuille (2020).

5. Conclusion

Competition in banking has been shown to play a key role for bank level strategic decisions concerning banks' funding mix and investments. Despite being a sector with very large dividend payout ratios, surprisingly little is known about the link between competition and dividend payout decisions in the banking sector. This study addresses this gap by investigating at the bank level the impact of competition on the bank dividend policy of US bank holding companies. We employ an exogenous measure of competition that encompasses state level deregulatory changes to competition following the passage of Interstate Banking and Branching Efficiency Act (IBBEA) of 1994. One of the important features of the IBBEA was that states retained discretion and flexibility over implementation, leading to differences in regulation and competition, which persisted across states. These patterns allow us to isolate unobserved factors that may undermine any observed causal relation between competition and bank dividends.

Using a dataset of US BHCs over the period 1994 to 2005, we find that banks operating in states characterised by higher levels of competition pay lower dividends than counterparts operating in states with less competition. This relationship is robust to controlling for peer effects, external corporate governance regulations, taxation dynamics and unobserved local economic conditions. Consistent with the information content of dividends hypothesis, we further find that the negative effect of competition on bank dividends is stronger for banks with low expected future earnings. We find no evidence supporting the view that banks rely less on dividends to alleviate concerns associated with free cash flow agency problems after competition increases. Finally, we find that supervisory scrutiny moderates the relationship between competition and bank dividends. In states with more lenient supervision, an increase in competition is associated with a smaller reduction in dividends.

Our results have implications for bank shareholders and debtholders as well as supervisors. As established by prior literature, efficiency gains arising from deregulation-induced competition could improve the welfare of bank stakeholders (at the expense of shareholders) via lower financial intermediation costs. Informational asymmetries between managers and outside stakeholders require a mechanism by which managers can reliably convey credible private information regarding future performance to less informed outsiders. Dividends appear to fulfil such a role given that banks subject to increased competition anticipate lower profitability and thus reduce dividends. This is also in line with the view that the sustainability of earnings plays a central role in driving bank dividends. We also find that more lenient supervisory oversight curbs these aforementioned effects. This suggests that stronger supervision of banks leads to bank payout decisions that more accurately reflect financial pressures arising from intensified competition following deregulation.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix

(See Table A1).

Table A1
Profitability analysis.

	Dependent variable: ROA					
	(1) ROA_t	(1) ROA_{t+1}	(3) ROA_{t+2}	(4) ROA_{t+3}	(5) ROA_{t+4}	(6) ROA_{t+5}
$DREG_{s,t-1}$	−0.005	−0.011	−0.010*	−0.014**	−0.020***	−0.023***
	(0.009)	(0.007)	(0.005)	(0.006)	(0.006)	(0.007)
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
No. of Observations	16,188	13,260	10,691	8595	6860	5324
R-squared	0.714	0.720	0.733	0.739	0.761	0.780

Note: This table presents the causal effect of competition on bank profitability. The dependent variable is ROA (expressed in %); a direct proxy for profitability. Columns 1 to 6 utilise ROA observations ranging from time t to t + 5. All models are estimated using OLS with bank and year fixed effects. Bank level control variables (except for profitability) are included but they are not reported for brevity. Standard errors are clustered at the state level and shown in parentheses. *,**, and *** denote significance level at 10%, 5%, and 1%, respectively.

References

Abadie, A., 2005. Semiparametric difference-in-differences estimators. Rev. Econ. Stud. 72 (1), 1–19.
Abadie, A., Athey, S., Imbens, G.W., Wooldridge, J., 2017. When should you adjust standard errors for clustering? NBER Working Paper, 24003.
Abreu, J.F., Gulamhussen, M.A., 2013. Dividend payouts: evidence from U.S. bank holding companies in the context of the financial crisis. Finance 22, 54–65.
Adams, R.B., Mehran, H., 2008. Corporate performance, board structure, and their determinants in the banking industry. Federal Reserve Bank of New York Staff Reports, No, p. 330.
Adhikari, B.K., Agrawal, A., 2018. Peer influence on payout policies. Finance 48, 615–637.
Agarwal, S., Lucca, D., Seru, A., Trebbi, F., 2014. Inconsistent regulators: evidence from banking. Q. J. Econ. 129 (2), 889–938.
Agrawal, A., Cooper, T., 2015. Insider trading before accounting scandals. Finance 34 (3), 169–190.
Allen, F., Carletti, E., Marquez, R., 2011. Credit market competition and capital regulation. Rev. Financ. Stud. 24 (4), 983–1018.
Allen, F., Gale, D., 2000. Corporate governance and competition: theoretical and empirical perspectives. Cambridge University Press, Cambridge, pp. 23–94.
Angelini, P., Cetorelli, N., 2003. The effects of regulatory reform on competition in banking industry. J. Money Credit Bank. 35 (5), 663–684.
Arena, M.P., Kutner, G.W., 2015. Territorial tax system reform and corporate financial policies. Rev. Financ. Stud. 28 (8), 2250–2280.
Baker, H.K., Farrelly, G.E., Edelman, R.B., 1985. A survey of management views on dividend policy. Financ. Manag. 14 (3), 78–84.
Beaver, W., Eger, C., Ryan, S., Wolfson, M., 1989. Financial reporting, supplemental disclosures, and bank share prices. J. Account. Res. 27 (2), 157–178.
Beck, T., Levine, R., Levkov, A., 2010. Big bad banks? The winners and losers from bank deregulation in the United States. J. Financ. 65 (5), 1637–1667.
Becker-Blease, J.R., 2011. Governance and innovation. Finance 17 (4), 947–958.
Benartzi, S., Michaely, R., Thaler, R., 1997. Do changes in dividends signal the future or the past? J. Financ. 52 (3), 1007–1034.
Berger, A.N., Kasyap, A.K., Scalise, J.M., 1995. The transformation of the U.S. banking industry: what a long, strange trip it's been. Brook. Pap. Econ. Act. 2, 55–218.
Berger, A.N., Molyneux, P., Wilson, J.O.S., 2020. Banks and the real economy: an assessment of the research. Finance 62, 101513.
Berger, A.N., Ghoul, S.E., Guedhami, O., Roman, R.A., 2022a. Geographic deregulation and banks' cost of equity capital. J. Int. Money Financ. 120, 120498.
Berger, A.N., Öztekin, Ö., Roman, R.A., 2022b. Geographic deregulation and bank capital structure. Unpublished Working Paper.
Bertrand, M., Mullainathan, S., 2003. Enjoying the quiet life? Corporate governance and managerial preferences. J. Polit. Econ. 111 (5), 1043–1075.
Bertrand, M., Duflo, E., Mullainathan, S., 2004. How much should we trust differences-in-differences estimates? Q. J. Econ. 119 (1), 249–275.
Bhattacharya, S., 1979. Imperfect information, dividend policy, and 'the bird in the hand' fallacy. Bell J. Econ. 10, 259–270.
Black, S.E., Strahan, P.E., 2002. Entrepreneurship and bank credit availability. J. Financ. 57 (6), 2807–2833.
Borusyak, K., Jaravel, X., Spiess, J., 2022. Revisiting event study designs: Robust and efficient estimation. CEPR Discussion Paper No. DP17247.
Brav, A., Graham, J.R., Harvey, C.R., Michaely, R., 2005. Payout policy in the 21st century. J. Financ. Econ. 77 (3), 483–527.
Burks, J.J., Cuny, C., Gerakos, J., Granja, J., 2018. Competition and voluntary disclosure: Evidence from deregulation in the banking industry. Rev. Acc. Stud. 23 (4), 1471–1511.
Bushman, R.M., Smith, A.J., 2001. Financial accounting information and corporate governance. J. Account. Econ. 32 (1–3), 237–333.

Cain, M.D., McKeon, S.B., Solomon, S.D., 2017. Do takeover laws matter? Evidence from five decades of hostile takeovers. J. Financ. Econ. 124, 464–485.
Callaway, B., and Sant'Anna, P. H., 2021. Difference-in-differences with multiple time periods, *Journal of Econometrics*, 225(2), pp.200-230.
Chen, Y., Greenbaum, S.I., Thakor, A.V., 1986. Information reusability, competition and bank asset quality. J. Bank. Financ. 10 (2), 243–253.
Chronopoulos, D., Wilson, J.O.S. and Yilmaz, M. 2022. Stakeholder Orientation and Bank Payout Policy: Evidence from US Constituency Statutes. *British Journal of Management*, forthcoming.
Claessens, S., Laeven, L., 2004. What drives bank competition? Some international evidence. J. Money Credit Bank. 36 (3), 563–583.
Coccorese, P., Pellechia, A., 2013. Multimarket contact, competition and pricing in banking. J. Int. Money Financ. 37, 187–214.
Cornaggia, J., Mao, Y., Tian, X., Wolfe, B., 2015. Does banking competition affect innovation? J. Financ. Econ. 115 (1), 189–209.
Cziraki, P., Laux, C., Loranth, G., 2022. Understanding Bank Payouts during the Crisis of 2007–2009. *The*. Rev. Corp. Financ. Stud. cfac015.
Darrough, M.N., Stoughton, N.M., 1990. Financial disclosure policy in an entry game. J. Account. Econ. 12 (1–3), 219–243.
de Chaisemartin, C., D'Haultfoeuille, X., 2020. Two-way fixed effects estimators with heterogeneous treatment effects. Am. Econ. Rev. 110 (9), 2964–2996.
De Chaisemartin, C., D'Haultfoeuille, X., 2022. Difference-in-differences estimators of intertemporal treatment effects. NBER Working Paper 29873.
DeAngelo, H., Stulz, R.M., 2015. Liquid-claim production, risk management and bank capital structure: why high leverage is optimal for banks. J. Financ. Econ. 116 (2), 219–236.
DeAngelo, H., DeAngelo, L., Stulz, R.M., 2006. Dividend policy and the earned/contributed capital mix: a test of the life-cycle theory. J. Financ. Econ. 81 (2), 227–254.
Degryse, H., Ongena, S., 2007. The impact of competition on bank orientation. J. Financ. Intermed. 16 (3), 399–424.
DeYoung, R., 2019. Banking in the United States. In: Berger, A., Molyneux, P., Wilson, J.O.S. (Eds.), Oxford Handbook of Banking. 3rd ed. Oxford University Press, Oxford.
DeYoung, R., Hasan, I., Kirchhoff, B., 1998. The impact of out-of-state entry on the cost of efficiency of local commercial banks. J. Econ. Bus. 50, 191–203.
Easterbrook, F.H., 1984. Two agency-cost explanations of dividends. Am. Econ. Rev. 74 (4), 650–659.
Evanoff, D.D., Ors, E., 2008. The competitive dynamics of geographic deregulation in banking: implications for productive efficiency. J. Money Credit Bank. 40 (5), 897–928.
Fama, E.F., French, K.R., 2001. Disappearing dividends: changing firm characteristics or lower propensity to pay? J. Financ. Econ. 60 (1), 3–43.
Fang, V.W., Tian, X., Tice, S., 2014. Does stock liquidity enhance or impede firm innovation? J. Financ. 69 (5), 2085–2125.
Favara, G., Imbs, J., 2015. Credit supply and the price of housing. Am. Econ. Rev. 105 (3), 958–992.
Floyd, E., Li, N., Skinner, D.J., 2015. Payout policy through the financial crisis: the growth of repurchases and the resilience of dividends. J. Financ. Econ. 118, 299–316.
Forti, C., Schiozer, R.F., 2015. Bank dividends and signaling to information-sensitive depositors. J. Bank. Financ. 56 (7), 1–11.
Gibson, S., 2000. On the information content of bank loan-loss disclosures: a theory and evidence from Japan. Int. Rev. Financ. 1 (1), 53–80.
Giroud, X., Mueller, H.M., 2010. Does corporate governance matter in competitive industries? J. Financ. Econ. 95 (3), 312–331.
Goetz, M., 2018. Competition and bank stability. *Journal of Financial Intermediation*, 35 (Part A), pp.57-69.
Goodman-Bacon, A., 2021. Difference-in-differences with variation in treatment timing. J. Econ. 225 (2), 254–277.
Graham, J.R., Harvey, C.R., Rajgopal, S., 2005. The economic implications of corporate financial reporting. J. Account. Econ. 40 (1–3), 3–73.
Grennan, J., 2019. Dividend payments as a response to peer influence. J. Financ. Econ. 131 (3), 549–570.
Grullon, G., Larkin, Y., Michaely, R., 2019. Dividend policy and product market competition. Unpublished Working Paper.
Ham, C.G., Kaplan, Z.R., Leary, M.T., 2020. Do dividends convey information about future earnings? J. Financ. Econ. 136 (2), 547–570.
Hannan, T., Prager, R.A., 1998. The relaxation of entry barriers in the banking industry: an empirical investigation. J. Financ. Serv. Res. 14 (3), 171–188.
Hart, O.D., 1983. The market mechanism as an incentive scheme. Bell J. Econ. 14 (2), 366–382.
Hirtle, B., 2004. Stock repurchases and bank holding company performance. J. Financ. Intermed. 13 (1), 28–57.
Hirtle, B., Kovner, A., Plosser, M., 2020. The impact of supervision on bank performance. J. Financ. 75 (5), 2765–2808.
Hoberg, G., Phillips, G., Prabhala, N., 2014. Product market threats, payouts, and financial flexibility. J. Financ. 69 (1), 293–324.
Holmström, B., 1982. Moral hazard in teams. Bell J. Econ. 13 (2), 324–340.
Honoré, B.E., 1992. Trimmed LAD and least squares estimation of truncated and censored regression models with fixed effects. Econometrica 60 (3), 533–565.
Huang, R., 2008. Evaluating the real effect of bank branching deregulation: comparing contiguous counties across US state borders. J. Financ. Econ. 87, 678–705.
Huang, R., Tan, K.J.K., Faff, R.W., 2016. CEO overconfidence and corporate debt maturity. Finance 36, 93–110.
Humphrey, D.B., Pulley, L.B., 1997. Banks' responses to deregulation: profits, technology, and efficiency. J. Money Credit Bank. 29 (1), 73–93.
Inderst, R., Mueller, H.M., 2008. Bank capital structure and credit decisions. J. Financ. Intermed. 17 (3), 295–314.
Jayaratne, J., Strahan, P.E., 1996. The finance-growth nexus: evidence from bank branch deregulation. Q. J. Econ. 111 (3), 639–670.
Jayaratne, J., Strahan, P.E., 1998. Entry restrictions, industry evolution and dynamic efficiency: evidence from commercial banking. J. Law Econ. 41, 239–274.
Jensen, M.C., 1986. Agency costs of free cash flow, corporate finance, and takeovers. Am. Econ. Rev. 76 (2), 323–329.
Jiang, L., Levine, R., Lin, C., 2016. Competition and bank opacity. Rev. Financ. Stud. 29 (7), 1911–1942.
Jiang, L., Levine, R., Lin, C., 2020. Bank deregulation and corporate risk. Finance 60, 101520.
John, K., Knyazeva, A., Knyazeva, D., 2015. Governance and payout precommitment. Finance 33, 101–117.
Johnson, C.A., Rice, T., 2008. Assessing a decade of interstate bank branching. Washington & Lee Law Rev. 65, 73–127.
Kanas, A., 2013. Bank dividends, risk, and regulatory regimes. J. Bank. Financ. 37 (1), 1–10.
Keen, H., 1978. Bank dividend cuts: Recent experience and the traditional view. Business Review 11, 3–13.
Kerr, W.R., Nanda, R., 2009. Democratizing entry: Banking deregulations, financing constraints, and entrepreneurship. J. Financ. Econ. 94 (1), 124–149.
Krishnan, K., Nandy, D.K., Puri, M., 2014. Does financing spur small business productivity? Evidence from a natural experiment. Rev. Financ. Stud. 28 (6), 1768–1809.
Kroszner, R.S., Strahan, P.E., 1999. What drives deregulation? Economics and politics of the relaxation of bank branching restrictions. Q. J. Econ. 114 (4), 1437–1467.
La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R.W., 2000. Agency problems and dividend policies around the world. J. Financ. 55 (1), 1–33.
Lang, L.H.P., Stulz, R.M., Walkling, R.A., 1991. A test of the free cash flow hypothesis: the case of bidder returns. J. Financ. Econ. 29 (2), 315–335.
Leary, M.T., Roberts, M.R., 2014. Do peer firms affect corporate financial policy? J. Financ. 69 (1), 139–178.
Li, X., 2010. The impacts of product market competition on the quantity and quality of voluntary disclosures. Rev. Acc. Stud. 15 (3), 663–711.
Lintner, J., 1956. Distribution of incomes of corporations among dividends, retained earnings, and taxes. Am. Econ. Rev. 46 (2), 97–113.
Liu, C.-C., Ryan, S.G., Wahlen, J.M., 1997. Differential valuation implications of loan loss provisions across banks and fiscal quarters. Account. Rev. 72 (1), 133–146.
Lobo, G.J., Yang, D., 2001. Bank managers' heterogeneous decisions on discretionary loan loss provisions. Rev. Quant. Finan. Acc. 16, 223–250.
Macey, J. and O'Hara, M., 2016. Bank corporate governance: a proposal for the post-crisis world. *Federal Reserve Bank of New York Economic Policy Review*, (August), pp.85–106.
Meslier, C., Morgan, D.P., Samolyk, K., Tarazi, A., 2016. The benefits and costs of geographic diversification in banking. J. Int. Money Financ. 69, 287–317.
Michaely, R., Roberts, M.R., 2012. Corporate dividend policies: lessons from private firms. Rev. Financ. Stud. 25 (3), 711–746.
Miller, M.H., Modigliani, F., 1961. Dividend policy, growth, and the valuation of shares. J. Bus. 34, 411–433.
Miller, M.H., Rock, K., 1985. Dividend policy under asymmetric information. J. Financ. 40, 1031–1051.
Nalebuff, B.J., Stiglitz, J.E., 1983. Prizes and incentives: towards a general theory of compensation and competition. Bell J. Econ. 14 (1), 21–43.

Nguyen, D.D., Hagendorff, J., Eshraghi, A., 2017. Does a CEO's cultural heritage affect performance under competitive pressure? Rev. Financ. Stud. 31 (1), 97–141.
Nissim, D., Ziv, A., 2001. Dividend changes and future profitability. J. Financ. 56 (6), 2111–2133.
Niu, J., 2008. Bank competition, risk, and subordinated debt. J. Financ. Serv. Res. 33 (1), 37–56.
Onali, E., 2014. Moral hazard, dividends, and risk in banks. J. Bus. Financ. Acc. 41 (1–2), 128–155.
Onali, E., Galiakhmetova, R., Molyneux, P., Torluccio, G., 2016. CEO power, government monitoring, and bank dividends. J. Financ. Intermed. 27, 89–117.
Oster, E., 2019. Unobservable selection and coefficient stability: theory and evidence. J. Bus. Econ. Stat. 37 (2), 187–204.
Patnam, M., 2011. Corporate networks and peer effects in firm policies. Unpublished Working Paper.
Petersen, M.A., Rajan, R.G., 1995. The effect of credit market competition on lending relatinoships. Q. J. Econ. 110 (2), 407–443.
Rice, T., Strahan, P.E., 2010. Does credit competition affect small-firm finance? J. Financ. 65 (3), 861–889.
Roberts, M.R., Whited, T.M., 2013. Endogeneity in empirical corporate finance. In: Constantinides, G.M., Harris, M., Stulz, R.M. (Eds.), Handbook of the Economics of Finance. Elsevier, Amsterdam, pp. 493–572.
Saunders, A., Schumacher, L., 2000. The determinants of bank interest rate margins: an international study. J. Int. Money Financ. 19, 813–832.
Schmidt, K.M., 1997. Managerial incentives and product market competition. Rev. Econ. Stud. 64 (2), 191–213.
Shleifer, A., 1985. A Theory of yardstick competition. RAND J. Econ. 16 (3), 319–327.
Spong, K., 2000. Banking regulation: its purposes, implementation, and effects. Federal Reserve Bank of Kansas, Kansas.
Stiroh, K.J., Strahan, P.E., 2003. Competitive dynamics of deregulation, evidence from US banking. J. Money Credit Bank. 35 (5), 801–828.
Theis, J., Dutta, A.S., 2009. Explanatory factors of bank dividend policy: revisited. Manag. Financ. 35 (6), 501–508.
Tripathy, N., Wu, D., Zheng, Y., 2021. Dividends and financial health: evidence from US bank holding companies. Finance 66, 101808.
Turner, J.D., Ye, Q., Zhan, W., 2013. Why do firms pay dividends?: evidence from an early and unregulated capital market. *Review of Finance* 17, 1787–1826.
Wahlen, J.M., 1994. The nature of information in commercial bank loan loss disclosures. Account. Rev. 69 (3), 455–478.