Creditor rights, bank competition, and stability: International evidence☆

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ABSTRACT

The paper exploits changes in bankruptcy laws in 15 countries to analyze the effect of creditor rights on bank competition and stability. I find that stronger creditor rights in bankruptcy increase bank competition, especially in countries with less stringent restrictions on bank entry and non-traditional bank activities. The increase in bank competition lowers bank stability and counteracts other positive effects of stronger creditor rights on bank stability through higher recovery rates. Empirical analysis controls for changes in creditor rights outside bankruptcy and the results are robust to alternative specifications, alternative sample definitions, and omitted variables and endogeneity controls.

1. Introduction

This paper analyzes how changes in creditor rights in bankruptcy affect bank competition and risk. The law and finance literature has extensively highlighted the relevance of creditor rights for a wide set of bank and borrowers' decisions (La Porta et al., 2008). Stronger creditor rights are associated with higher banks' credit supply (Djankov et al., 2007; Haselmann et al., 2010), lower borrowers' credit demand (Vig, 2013; Cho et al., 2014), higher development of corporate bond markets (Gu and Kowalewski, 2016), lower dividend payments (Brockman and Unlu, 2009), higher cash holdings (Yung and Nafar, 2014), lower corporate risk-taking and innovation (Acharya and Subramanian, 2009; Acharya et al., 2011), lower corporate investment during financial crises (González, 2016), and higher economic growth (Houston et al., 2010). However, to my knowledge, there are no papers analyzing the effect of creditor rights on bank competition and there is scarce and mixed evidence on the effect of creditor rights on bank risk. This absence is surprising because bank competition may be an important channel through which creditor rights impact on bank risk (Keeley, 1990; Berger et al., 2009). This paper aims to fill this gap by analyzing how legal changes in creditor rights in bankruptcy impact on bank competition, how other regulatory characteristics in a country may shape the effect of creditor rights on bank competition, and how the change in bank competition affects bank risk.

I argue in this paper that stronger creditor rights may affect bank competition because they influence credit supply and demand. Stronger creditor rights reducing bank losses in bankruptcy lead banks to provide credit to a wider and/or riskier set of borrowers, and to increase their credit supply (Djankov et al. 2007). At the same time, borrowers anticipate greater losses in case of bankruptcy and

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reduce their credit demand (Acharya and Subramanian, 2009; Acharya et al., 2011; Cho et al., 2014). The increase in the credit supply and the reduction in credit demand following an increase in creditor rights may affect bank market competition (Houston et al., 2010).

This paper makes three main contributions. First, I directly test whether changes in creditor rights affect bank competition. This analysis extends the empirical literature on the real and finance effects of creditor rights in bankruptcy. Second, I analyze how the effects of creditor rights on competition depend on other national regulatory characteristics such as regulation on bank entry and non-traditional bank activities. Empirical studies analyzing the determinants of bank competition find that tighter restrictions on bank entry and non-traditional activities are associated with less bank competition (Barth et al., 2004; Claessens and Laeven, 2004). I now test if differences across countries in these two country characteristics also shape the impact of creditor rights on bank competition. In particular, I argue that tighter restrictions may promote not only less bank competition but also less sensitivity of bank competition to changes in creditor rights. Finally, extensive literature suggests that bank competition increases bank risk-taking incentives (Keeley, 1990; Berger et al., 2009; Beck et al., 2013). Following this literature, I also empirically analyze how changes in bank competition, following changes in creditor rights, influence bank risk.

The empirical analysis focuses on time-series exogenous legal changes in creditor rights in bankruptcy in an international sample of a maximum of 2,223 banks from 68 countries over the 2005–2013 period. This approach allows me to define "quasi-natural experiments" and apply a difference-in-differences (DID, henceforth) methodology to overcome the traditional problems of omitted variables and endogeneity in cross-sectional studies. I use the Lerner index as a proxy for bank market power, inversely related to bank competition, and the Z-score and the ratio of non-performing loans as proxies for bank risk.

I identify 15 legal changes in bankruptcy laws over the 2005–2013 period. I use banks in countries without changes in creditor rights as a control group and I check that estimations meet the conditions for a DID analysis. The treatment and control groups meet the parallel trends assumption and I apply several strategies to verify that the legal changes in creditor rights are exogenous to bank competition. I not only use all non-reforming countries as the control group but also define a control group of countries using a propensity-score based matching technique to compare the reforming countries with the non-reforming countries that are most similar in terms of macroeconomic variables, legal origin, institutional quality, health of the banking industry, bank development, and stock market development. I check that the results are robust to the exclusion of countries suffering systemic and borderline banking crises, where changes in bank competition related to crisis resolution may be more important. Moreover, the empirical analysis controls for changes in creditor rights in collateral laws outside bankruptcy. Countries changing creditor protection in bankruptcy may also change their protection outside bankruptcy. Controlling for these changes is important to avoid confounding effects when we analyze protection in bankruptcy because Haselmann et al. (2010) show that the two types of legal change have a different impact on bank lending.

The results suggest that stronger creditor rights in bankruptcy on average increase bank competition. Moreover, there are differences across countries depending on regulatory characteristics. Stronger creditor rights increase bank competition more in countries with less stringent restrictions on bank entry and non-traditional bank activities. This result suggests that the impact of creditor rights on bank competition is higher in countries where other regulatory characteristics promote higher bank competition.

In a second stage, I analyze how the change in bank competition, induced by the legal change in creditor rights, affects bank risk. I find that the increase in bank competition increases bank risk. In particular, increases in competition are associated with lower banks' Z-scores and higher ratios of non-performing loans. Additionally, the results reveal that increases in creditor rights in bankruptcy reduce bank risk through other channels apart from bank competition. This suggests that higher recovery rates in bankruptcy offset the higher default rates providing there were no changes in bank competition after the increase in creditor rights in bankruptcy. All the regressions include time-varying macroeconomic, institutional, and financial development variables, and are robust to the inclusion of country-fixed effects to control for any time-invariant difference between treatment and control groups.

The rest of the paper is organized as follows. Section 2 analyzes the related literature and discusses the hypotheses tested in the empirical analysis. Section 3 describes the data, sample, and variables. Section 4 explains the empirical analysis, and Section 5 presents the results and robustness checks. Finally, Section 6 concludes.

2. Related literature and hypotheses

2.1. Related literature

The paper relates to three strands of the literature. First, it relates to the law and finance literature extensively analyzing the finance and real effects of creditor rights. This literature shows both positive and negative effects for creditor rights. On the positive side, the initial paper by Djankov et al. (2007) shows that stronger creditor rights extend credit supply and are associated with higher country ratios of private credit to GDP. Subsequent papers confirm the positive influence of creditor rights on bank development (Li et al., 2018) and show that stronger creditor rights reduce not only the cost of bank debt but also favor the development of corporate bond markets (Gu and Kowalewski, 2016). However, the effect on the rates of corporate leverage is negative because stronger creditor rights reduce credit demand from firms when their shareholders and managers anticipate greater losses in case of bankruptcy. Debt is accessible to a greater proportion of firms but, on average, corporate debt ratios are lower (Vig, 2013; Cho et al., 2014). Stronger creditor rights are also associated with higher bank performance (Kalyvas and Mamatzakis, 2017), lower dividend payments (Brockman and Unlu, 2009), and higher cash holdings (Yung and Nafar, 2014),

On the negative side, there is empirical evidence showing that stronger creditor rights reduce corporate risk-taking (Acharya et al., 2011), innovation (Acharya and Subramanian, 2009), and cause a greater reduction in corporate investment during financial crises (González, 2016). The balance of these positive and negative effects seems positive because Houston et al. (2010) find a positive effect

of creditor rights on economic growth. However, to my knowledge, there is no previous evidence analyzing the effect of creditor rights on bank competition and only limited evidence analyzing their effect on bank risk.

Second, the paper relates to the literature analyzing the determinants of bank competition. This literature uses international data to capture the relevance of regulation explaining bank competition. Claessens and Laeven (2004) show that tighter restrictions on bank entry and non-traditional bank activities reduce bank competition. Barth et al. (2004) suggest in a cross-sectional study for 107 countries that tighter entry restrictions limit competition because they are associated with higher interest margins. More recently, Calderon and Schaeck (2016) apply a DID analysis and document that government interventions in banks (liquidity support, re-capitalizations, and nationalizations) during banking crises increase competition in a sample of 40 countries. However, there are no papers analyzing the relevance of creditor rights for bank competition. This paper links the above two strands of the literature by analyzing the influence of creditor rights on bank competition.

Finally, the paper relates to the extensive literature analyzing the determinants of bank risk and financial crises (Demirgüç-Kunt and Detragiache, 2002; Calomiris and Haber, 2014). The important real effects of banking crises (Kroszner et al., 2007) and the contagion effects among banks in different countries (Daly et al., 2019) and between the banking sector and the stock market (Batten et al., 2022) make it especially interesting to know the drivers of bank risk. Empirical evidence highlights the relevance of bank competition (Keeley, 1990; Boyd and De Nicolò, 2005, Berger et al., 2009), bank safety nets (Demirgüç-Kunt and Detragiache, 2002), market structure (Beck et al. 2006), bank governance (Laeven and Levine, 2009; Kinateder et al., 2021), and political bargains (Calomiris and Haber, 2014) as determinants of bank risk.

I now focus on the effect of creditor rights on bank risk. Closely related to my paper, two previous papers have theoretically balanced two potential opposite effects on expected recovery and default rates (Houston et al., 2010; Biswas, 2019). On the one hand, stronger creditor rights may reduce bank risk because they allow banks to achieve higher recovery rates in the event of borrower default. Moreover, stronger creditor rights reduce the risk-taking incentives of borrowers because firms' shareholders and managers anticipate greater losses in bankruptcy. The reduction in borrowers' risk diminishes expected default rates and bank risk (Acharya and Subramanian, 2009). On the other hand, stronger creditor rights may lead banks to ease their lending standards as a consequence precisely of the anticipation of higher recovery rates in case of borrower default. This effect increases the average expected default rate of banks' loans. Therefore, the net effect of stronger creditor rights on bank risk is not clear and depends on whether the higher expected recovery rates in default offset potential higher expected default rates. Empirical evidence provides opposing results. Houston et al. (2010) show that stronger creditor rights are associated with greater bank risk-taking and a higher likelihood of financial crisis in an OLS analysis of 2,400 banks in 69 countries. They conclude that the increase in default rates because of easing lending standards is not offset by higher recovery rates in bankruptcy. Biswas (2019), on the other hand, finds weak evidence of stronger creditor rights reducing bank risk after analyzing changes in bankruptcy laws in 13 countries. However, neither of these two papers analyze the influence of creditor rights on banking risk through changes in banking competition.

I now extend the above literature by analyzing the importance of bank competition as a channel for explaining the effect of creditor rights on bank risk, based on the extensive literature analyzing the influence of bank competition on bank risk. The traditional "competition-fragility" view suggests that more bank competition increases bank risk-taking incentives by reducing banks' profit margin and charter value (Keeley, 1990). Conversely, the "competition-stability" view suggests that more bank market competition leads to lower interest rates on loans, which induce borrowers to reduce their risk-taking. Lower borrowers' risk reduces bank credit risk (Boyd and De Nicolò, 2005).[2] Berger et al. (2009) show that the two views need not necessarily yield opposing predictions and that the competition-fragility view subsumes the competition-stability view. If low bank competition increases both bank credit risk and charter value, banks may protect their higher charter value from higher credit risk through more equity capital or other risk-mitigating techniques. Berger et al. (2009) and Beck et al. (2013), in samples of banks from 23 and 79 countries, respectively, show that charter value and the arguments of the competition-fragility view are dominant to explain the relationship between competition and bank risk.

2.2. Hypotheses

I argue in this paper that changes in creditor rights may affect bank market competition and that the change in bank competition may be a channel through which creditor rights impact on bank risk. Changes in creditor rights may affect bank competition because they affect bank credit supply and the demand of existing and new entrant banks. Stronger creditor rights in bankruptcy lead banks to anticipate higher recovery rates and lower losses in case of borrower failure. This expectation not only leads existing creditors to ease their lending standards and increase credit supply but also increases the benefits anticipated by potential new entrants and, therefore, the threat of entry. The increase in credit supply by incumbents and new entrants may increase competition among banks trying to attract new borrowers and keep the current ones. Stronger creditor protection in bankruptcy also modifies credit demand because shareholders and managers anticipate greater losses in bankruptcy. In particular, higher expected costs of bankruptcy would reduce firms' demand for bank credit (Acharya and Subramanian, 2009; Acharya et al., 2011; Cho et al., 2014). This reduction in credit demand would imply a lower credit quantity in the equilibrium and may lead banks to increase competition to diminish its impact on their market shares. Following the above arguments, I expect a strengthening of creditor rights in bankruptcy to increase bank market competition. Therefore, the first hypothesis is:

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[2] Turk Ariss (2010), Agoraki et al. (2011), Jimenez et al. (2013), Forssbaeck and Shehzad (2015) and Davis et al. (2020), among others, provide support for the competition-fragility view analyzing markets in different geographical areas. However, Beck et al. (2006), Schaeck et al. (2009), and Goetz (2018), among others, provide support for the competition-stability view.

H1. An increase (decrease) in creditor rights in bankruptcy increases (reduces) bank market competition.

I also consider potential cross-country variation in the relationship between creditor rights and bank competition depending on country variables that determine bank competition. Claessens and Laeven (2004) and Barth et al. (2004) show in international samples that legal restrictions on bank entry and on non-traditional bank activities are the main drivers of differences across countries in bank competition. They find that less bank competition is associated with tighter legal restrictions on bank entry and on non-traditional bank activities. Such differences in bank competition may also lead to differences in the impact of creditor rights on bank competition. In particular, the lack of conditions to promote competition would reduce the sensitivity of bank competition to changes in any other regulatory variable and, in this case, in creditor rights. Therefore, I expect that tighter restrictions on bank entry and on non-traditional bank activities that do not promote bank competition would reduce the impact of changes in creditor rights on bank competition. This is the second hypothesis:

H2. Tighter (less stringent) restrictions on bank entry and on non-traditional bank activities reduce (increase) the impact of creditor rights on bank competition.

Finally, the impact of creditor rights on bank competition may further affect bank risk following the extensive literature analyzing the impact of bank competition on stability. For instance, if an increase in creditor protection leads to higher (lower) bank market competition, it may increase (reduce) bank risk under the dominant competition-fragility view. Higher bank competition reducing bank margins and charter values increases the benefits of risk-taking for bank shareholders. It reinforces the expansion of credit to a wider and/or riskier set of borrowers by easing lending standards (Keeley, 1990; Berger et al., 2009; Beck et al., 2013). In terms of the trade-off between recovery and default rates, it increases expected default rates but not recovery rates. The consequence is that more bank competition, following an increase of creditor rights in bankruptcy, increases bank risk. This argument leads me to expect that the more stronger creditor rights increase bank competition, the more they will increase bank risk. Therefore, the third hypothesis is:

H3. Stronger (weaker) creditor rights increasing (diminishing) bank competition will further increase (reduce) bank risk.

3. Data and methodology

3.1. Data

I use several main data sources. Bank-level information comes from the BankFocus Bureau van Dijk Database to annually compute the Lerner index, Z-score, ratio of non-performing loans, and bank-level control variables. Whenever they are available, I use consolidated bank balance-sheet and income-statement data. All data are expressed in US dollars and in real prices. I use the World Bank legal rights index to measure countries' creditor rights in bankruptcy annually since 2005. In 2013 the World Bank changed the methodology to compute the index of legal rights and, therefore, data from 2013 onward are not comparable with data before 2013. For this reason, I use the longer homogeneous time series of creditor rights and focus on changes in creditor rights from 2005 to 2013. I use additional databases, mostly from the World Bank, to obtain country information on bank regulation and supervision, institutions, financial development, and macroeconomic variables. Information on countries suffering systemic and borderline banking crises comes from Laeven and Valencia (2018). The databases are listed in Table A1 in the Appendix.

I initially considered the 128 countries for which the World Bank's Doing Business Report provides information on the index of legal rights. I eliminated countries for which I did not have enough data to compute the Lerner index or for which there was insufficient information to compute all the variables included in the regressions. I control for countries experiencing changes in collateral laws because Haselmann et al. (2010) show that the protection of collateral outside bankruptcy is an important determinant of creditor rights and their inclusion might bias the results for creditor protection in bankruptcy. I also control for the existence of systemic and borderline banking crises in the country to avoid confounding effects of changes in bank competition caused by crisis resolution (Calderon and Schaeck, 2016). I identify 16 countries experiencing 16 changes in bankruptcy law: seven countries experienced changes in bankruptcy law, and nine countries experienced changes in both bankruptcy law and collateral law over the 2005–2013 period. I exclude banks from United Arab Emirates because it experienced an increase in creditor rights in bankruptcy but also a decrease in creditor rights outside bankruptcy in the same year (2006). I additionally identify-four countries that only experienced changes in their collateral law (Denmark in 2007, Japan in 2006, Tunisia in 2008, and Ukraine in 2006). These four countries are excluded from the analysis because I limit the control group to countries not reforming their creditor rights.[3] Therefore, the final treatment group includes a maximum of 15 changes in bankruptcy laws in 15 countries.

I use two sets of control groups: 1) all countries that did not pass legal reforms in bankruptcy or collateral laws over the analysis period according to the legal rights index of the World Bank. I identify 53 countries without changes in the legal rights index over the 2005–2011 period with data on all the variables included in the empirical analysis; and 2) a matched sample where I select non-reforming countries using a propensity-score based matching technique. In a first step, I estimate a logit model with the existence in the country of a legal change in creditor rights in bankruptcy as a binary dependent variable. Explanatory variables are legal origin, the KKZ index as a proxy for institutional quality, the Z-score as a proxy for soundness of the banking industry, bank development, stock market development, GDP growth, the natural logarithm of GDP per capita, and the natural logarithm of population using data for 2005, the year immediately before the first legal reform analyzed in the paper. The objective is to select countries in the matched control group that are ex-ante as likely to have legal reforms as the countries in the treatment group and, then, to reduce endogeneity

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[3] The reduced number of changes in collateral law and the additional existence of systemic crises in Denmark and Ukraine in 2008 limit the ability to analyze the specific effect of changes in collateral law in a separated treatment group.

Table 1

Changes in creditor rights across countries: treatment and control groups. This table reports changes in creditor rights and countries in the treatment and control groups. Panel A reports countries with changes in bankruptcy law. It also reports changes in collateral law and matched countries using the propensity-score based matching technique. Panel B reports countries without legal changes in creditor rights (or in bankruptcy law or collateral law). The table reports for each country the mean value of the variables measuring bank market power (*Lerner*) and bank stability (*Z-score* and *Non-performing loans*), and gives information on countries suffering systemic and borderline crises over the 2005–2013 period.

Panel A: Countries with change(s) in their bankruptcy law							
Country	Year and type of change in Bankruptcy law	Year and type of change in Collateral law	Matched countries	Lerner	Z-score	Non-performing loans	Systemic and borderline banking crises (start of crisis)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Armenia	2007 (+1)		El Salvador	0.3202	1.1990	3.7080	
Bangladesh	2008 (-1)		Philippines	0.2627	1.0967	5.6080	
Croatia	2006 (+1)	2007 (+1); 2008 (+1)	Brazil	0.2695	1.3181	6.8057	
Czech Republic	2009 (-1)		Panama	0.2589	1.3107	4.0696	
France	2007 (+1)	2008 (+1)	Mauritius	0.1850	1.2104	6.0641	Borderline (2008)
Germany	2009 (-1)		Austria	0.0939	1.1805	4.0178	Systemic (2008)
Ghana	2008 (+1)	2011 (+1)	Slovak Republic	0.3409	1.0880	11.6036	
India	2007 (+1)	2008 (+1)	Costa Rica	0.2570	1.3379	2.8115	
Kyrgyz Republic	2007 (+1)	2010 (+3)	Nigeria	0.4161	1.2269	3.2325	
Peru	2007 (+1)	2007 (+3)	Bolivia	0.3546	1.2453	2.1238	
Romania	2008 (+1)		Bulgaria	0.1586	0.8886	11.3929	
Serbia	2011 (+1)	2007 (+1)	Morocco	0.1424	0.8734	11.3171	
Slovenia	2009 (-1)		Montenegro	0.1807	1.0773	5.8854	Borderline (2008)
Sri Lanka	2009 (+1)		Uruguay	0.2204	1.1636	9.2893	
Sweden	2010 (+1)	2006 (+1)	Kazakhstan	0.3273	1.2762	2.1839	Borderline (2008)
Panel B: All non-reforming countries							
Country				Lerner	Z-score	Non-performing loans	Systemic and borderline banking crises (start of crisis)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Argentina				0.2887	0.5864	2.7282	
Australia				0.1450	1.3061	0.9936	
Austria				0.1441	1.1822	4.0065	Systemic (2008)
Belgium				0.2473	1.0138	2.3075	Systemic (2008)
Bolivia				0.2123	1.1330	16.5503	
Botswana				0.2011	1.0483	4.4478	
Brazil				0.2029	0.9084	7.3587	
Bulgaria				0.2919	1.0953	6.0121	
Canada				0.1836	1.2434	1.0549	
Colombia				0.3127	1.2590	3.4518	
Costa Rica				0.0612	1.3017	5.3501	
Cyprus				0.2556	0.9823	11.8436	
El Salvador				0.3645	1.3318	4.2988	
Finland				0.0744	1.1075	1.2708	
Greece				0.2294	0.6368	11.1458	Systemic (2008)
Hungary				0.1898	1.0274	5.9885	Borderline (2008)
Indonesia				0.2070	1.3330	3.4649	
Ireland				0.2456	0.8807	2.5573	Systemic (2008)
Israel				0.2061	1.2418	5.2964	
Italy				0.2818	1.2377	4.6778	Borderline (2008)
Jamaica				0.3326	1.2127	3.6350	
Jordan				0.3583	1.3502	8.6300	
Kazakhstan				0.0240	0.8722	5.6993	Systemic (2008)
Kenya				0.3458	1.2256	9.3278	
Korea, Rep.				0.3213	1.1664	0.9560	
Latvia				0.2349	0.8304	5.1946	Systemic (2008)
Lithuania				0.1540	0.7874	7.1300	
Luxembourg				0.1749	1.0340	4.7261	Systemic (2008)
Macedonia, FYR				0.2915	1.1407	9.8442	
Malawi				0.2920	0.8725	1.1050	
Malaysia				0.1229	1.2846	4.5855	
Mauritius				0.4559	1.0985	3.2285	
Montenegro				0.0531	1.3344		
Morocco				0.2753	1.4551	5.9595	
Netherlands				0.1622	1.2113	2.3195	Systemic (2008)
New Zealand				0.1639	1.0945	1.5761	

(*continued on next page*)

Table 1 (*continued*)

Panel A: Countries with change(s) in their bankruptcy law

Country	Year and type of change in Bankruptcy law	Year and type of change in Collateral law	Matched countries	Lerner	Z-score	Non-performing loans	Systemic and borderline banking crises (start of crisis)
Nigeria				0.2767	1.1138	12.9686	Systemic (2009)
Norway				0.2517	1.0186	1.9165	
Oman				0.4229	1.3188	5.4065	
Pakistan				0.1513	0.9784	10.0820	
Panama				0.3507	1.2337	1.5572	
Philippines				0.1861	1.2357	10.1031	
Portugal				0.1723	1.0383	4.0520	Borderline (2008)
Russian Federation				0.1523	1.1793	3.1360	Borderline (2008)
Singapore				0.7394	1.5497	1.7730	
Slovak Republic				0.1048	1.0001	6.1192	
South Africa				0.1504	1.1047	3.4351	
Spain				0.1605	1.2233	2.0627	Systemic (2008)
Switzerland				0.2250	1.2958	3.3795	Borderline (2008)
Thailand				0.1726	1.2106	7.9070	
Turkey				0.3504	1.0511	4.7049	
Uganda				0.3336	1.1997	0.6340	
Uruguay				0.2492	0.7184	0.9037	

concerns in the changes in creditor rights. Table A3 in Appendix A reports the estimation results. In a second step, I obtain the propensity score (the probability of reforming creditor rights in bankruptcy in each country). In a final step, for every reforming country I find the non-reforming country with the closest propensity score. Each non-reforming country serves as a match for only one reforming country. I then use the second closest propensity score if the closest country has already been used as a matched country for a closest reforming country (Dahejia and Wahba, 2002). None of the countries in the matched control group suffered systemic or borderline banking crises over the analysis period.[4]

Table 1 reports the changes in bankruptcy law included in the treatment group, following the legal rights index of the World Bank. It also shows the changes in collateral law experienced by countries in the treatment group, matched countries and all non-reforming countries used as alternative control groups, and countries suffering systemic and borderline banking crises over the analysis period.

3.2. Variables

I now describe in more detail the proxies for the main variables: creditor rights, bank competition, and bank risk. Table A1 in the Appendix describes in detail all the variables used in the empirical analysis and their sources. Most of the control variables are self-explanatory and have been used in other cross-country studies.

3.2.1. Creditor rights

I use the information on the legal rights index developed by the World Bank between 2005 and 2013 to measure the protection of creditors in bankruptcy (*Bankruptcy*). The legal rights index also provides information on how a country's collateral law affects creditor protection outside bankruptcy (*Collateral*). This information allows me to control for changes in collateral law when a country implements both types of regulatory changes. *Bankruptcy* basically includes the legal indicators most widely used in the law and finance literature to measure creditor rights in bankruptcy since their initial use by Djankov et al. (2007). It is based on a score of 1 each for whether: (1) there is an automatic stay on secured creditors' rights; (2) secured creditors are paid first when a debtor defaults outside an insolvency procedure; (3) secured creditors are paid first when a firm is liquidated; and (4) no majority creditor consent is required for reorganization. Therefore, *Bankruptcy* ranges from 0 to 4, with higher values indicating stronger creditor protection in bankruptcy. *Collateral* is based on a score of one each for the following six characteristics: (1) whether any business can use movable assets as collateral while keeping their possession; (2) whether the law recognizes nonpossessory security interest in movable assets; (3) in all of the current assets; (4) in future assets; (5) whether all types of debts can be secured with a collateral agreement; and (6) whether there is a registry system for security interest in movable assets. Therefore, *Collateral* ranges from 0 to 6, with higher values indicating stronger creditor protection outside bankruptcy.

I consider each reform that implies a change in any of the above 10 indicators used in the index of legal rights elaborated by the

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[4] Jayaraman and Thakor (2014) and Biswas (2019) have previously used this matching technique based on macroeconomic variables to define the matched control group for countries experiencing changes in creditor rights in bankruptcy in the sample used by Djankov et al. (2007).

World Bank. The empirical analysis focuses on changes in any of the four indicators measuring creditor protection in bankruptcy (*Changebankruptcy*) and controls for changes in any of the six indicators measuring the protection of collateral outside bankruptcy. All the 15 reforms in bankruptcy law imply a change in the index by 1, with 11 increases and four decreases.[5] Table A2 in Appendix A shows the characteristics of all the changes in creditor rights in bankruptcy analyzed in the paper.

3.2.2. Bank competition

I use the Lerner index (*Lerner*) as a proxy inversely related to bank competition. Following the new empirical industrial organization literature, the Lerner index has been widely and recently used in the banking sector as a non-structural indicator of the degree of market power.[6] It defines the difference between price (interest rate) and marginal cost expressed as a percentage of price. It assumes that a divergence between product price and marginal cost of production is the essence of monopoly power. The Lerner index takes 0 in the case of perfect competition, and 1 under perfect monopoly. I estimate a single indicator of the Lerner index using the same procedure as Maudos and Fernández de Guevara (2004). Specifically, *Lerner = (P-MC)/P*, where the product price P is the total financial and operating income (interest income + commission income + fee income + trading income + total operating income) divided by total assets of the bank. MC is the marginal cost for each bank of producing an additional unit of output. The marginal cost is derived from a translog cost function (as explained in Appendix B). Table 1 shows that the mean value of *Lerner* ranges from a minimum of 0.0240 in Kazakhstan to a maximum of 0.7394 in Singapore.

3.2.3. Bank risk

I use the Z-score as a main proxy for bank insolvency risk following previous studies analyzing the effect of creditor rights on bank risk (Houston et al., 2010; Biswas, 2019).[7] This is the return on assets plus the capital-asset ratio divided by the standard deviation of asset returns. Specifically, *Z-score = (ROA + CAR)/SDROA*, where ROA is the rate of return on assets, CAR is the capital-asset ratio, and SDROA is an estimate of the standard deviation of the rate of return on assets. To calculate the standard deviation of ROA, I use a five-year moving window including the two previous years and the two subsequent years and I verify that using four or six years produces very similar results. A higher *Z-score* indicates that the bank is more stable because it is inversely related with the bank's insolvency probability. Because the *Z-score* is highly skewed, I use the natural logarithm of *Z-score*, which is normally distributed. Table 1 shows that Argentina has the minimum mean value of Z-score in the sample (0.5864), whereas Singapore has the maximum mean value (1.5497).

I additionally use the annual ratio of non-performing loans to total gross loans (*Non-performing loans*) as a traditional proxy for bank credit risk (Berger et al., 2009; Goetz, 2018). The ratio of non-performing loans ranges from a minimum mean value of 0.6340 in Uganda to a maximum mean value of 16.5503 in Bolivia. The lower availability of data for this variable reduces the number of banks included in the regressions and prevents banks from Montenegro from being included in the control group of non-reforming countries.

3.2.4. Control variables

Regressions include control variables at both bank and country-level. I include the following four bank-level control variables to explain both bank competition and risk: the natural logarithm of bank assets (*Size*), the percentage of liquidity assets over total assets (*Liquidity*), the percentage of interest income over total bank income (*Interest income*), and the percentage of overhead costs over total bank assets (*Overhead*). As control variables at country level, I include legal restrictions on bank entry (*Entry*), legal restrictions on non-traditional bank activities such as securities, insurance, real estate markets, and bank ownership and control of non-financial firms (*Restrict*), bank concentration (*Concentration*), institutional quality (*KKZ*), regulatory requirements of bank capital (*Capital stringency*), power of official supervisory authorities to take specific actions in banks (*Official supervision*), government expenditure as a share of the country's GDP as a proxy for government intervention in the economy (*Government spending*), the ratio of private credit by deposit money banks to GDP as a proxy for bank market development (*Bank development*), the ratio of stock market capitalization to GDP as a proxy for equity market development (*Equity market development*), real GDP growth (*GDPgrowth*), and the natural logarithm of GDP per capita (*LnGDPpc*). Claessens and Laeven (2004), Houston et al. (2010), Beck et al. (2013), and Biswas (2019), among others, have previously used these variables to explain bank competition and risk. A description and the sources of these control variables are given in Table A1 in Appendix A.

3.3. Identification strategy

I exploit changes in countries' legal reforms as natural experiments to identify causality through a DID analysis. The research design is borrowed from Djankov et al. (2007), Acharya and Subramanian (2009), and Biswas (2019). By comparing banks in the same country in

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[5] Creditor rights differ across the 15 countries included in the treatment group because there is a diversity of legal origins and La Porta et al. (2008) conclude that legal traditions explain well why legal rules differ. In the treatment group, there are common law countries (Bangladesh, Ghana, and India) and civil law countries, with different legal sub-traditions, such as the French tradition (France, Peru), German tradition (Germany), Scandinavian tradition (Sweden) or the socialist tradition (Armenia, Czech Republic, Kyrgyz Republic, Romania, Serbia, and Slovenia).

[6] Berger et al. (2009), Turk-Ariss (2010), Agoraki et al. (2011), Beck et al. (2013), Forssbaeck and Shehzad (2015), Calderon and Schaeck (2016), Biswas (2019), among others, have previously used the Lerner index as an indicator of bank market competition in cross-country studies.

[7] Berger et al. (2009), Laeven and Levine (2009), Demirgüç-Kunt and Huizinga (2010), Beck et al. (2013), among others, have recently also used the *Z-score* as the main proxy for bank insolvency risk in cross-country studies.

periods with different laws and using banks in non-reforming countries as a control group, I can control for unobserved country-level factors and identify causality from creditor rights to bank competition and risk. I use the following specification to apply the DID test:

$$Lerner_{i,t} = \alpha_0 + \alpha_1\ Changebankruptcy_{c,t} + \alpha_2\ X_{i,t-1} + \alpha_3\ Y_{c,t-1} + \alpha_i + \alpha_t + \varepsilon_{i,t}\ (1)$$

where i, c, and t refer, respectively, to bank, country and year. $Lerner_{i,t}$ is the Lerner index measuring bank market power for bank i in year t. $Changebankruptcy_{c,t}$ measures the change in creditor rights in bankruptcy in country c in year t. For a country c that underwent a creditor rights increase in year m, $Changebankruptcy$ equals zero (one) for the years before (after) the change, i.e., for t <= m (t >= m + 1). In contrast, for a country c that underwent a creditor rights decrease in year m, $Changebankruptcy$ equals one (zero) for the years before (after) the change, i.e., for t =< m (t >=m + 1). For countries that did not experience a creditor rights change, $Changebankruptcy$ always equals zero. Since $Changebankruptcy$ is defined as one (zero), one year after the change for countries that increased (decreased) their protection of creditor rights, α_1 measures the difference-in-difference effect a year after the change. A positive value for α_1 would indicate a positive (negative) impact of the strengthening (weakening) of creditor rights in bankruptcy on bank market power, and therefore, a negative (positive) impact on bank competition.

X is the set of bank-level control variables. Y refers to the set of country-specific control variables. I check the robustness of the results to alternative definitions of the set of control variables and lag all control variables by one year in order to reduce endogeneity concerns. α_i and α_t denote, respectively, bank and year fixed effects. Bank-fixed effects capture any unobserved difference between banks when they are time-invariant. Time dummies control for the potential confounding impact of the crisis, for potential global trends in bank competition, and for any global change in the macroeconomic environment that may affect bank competition in all countries in a particular year. This approach provides a stronger test since we are able to control for time-invariant bank characteristics as well as the time-varying effects that are common to all banks in the sample. A similar research design has been used by Acharya and Subramanian (2009) and Haselman et al. (2010). As bank-fixed effects absorb country-fixed effects, I check the robustness of the results using only country-fixed effects. In this last case, I cluster standard errors at the bank level to control for potential residual correlation caused by unobserved bank effects when bank-fixed effects are not included (Petersen, 2009).

In a second stage, I analyze the influence of the change in bank competition, caused by the change in creditor rights, on bank risk. As *Lerner* and the two proxies for bank risk (*Z-score* and the *Non-performing loans*) could be jointly impacted by changes in creditor rights, I instrument *Lerner* in the equation explaining bank risk. The specification of the IV regression is:

$$Z\text{-}score/Non\text{-}performing\ loans_{it} = \beta_0 + \beta_1\ Changebankruptcy_{c,t} + \beta_2\ Lerner_{i,t}^{IV} + \beta_3\ X_{i,t-1} + \beta_4\ Z_{c,t-1} + \beta_i + \beta_t + \delta_{ict}\ (2)$$

$Z\text{-}score_{it}$ is the Z-score ratio of bank i in year t. $Non\text{-}performing\ loans_{it}$ is the ratio of non-performing loans to total loans of bank i in year t. $Lerner_{i,t}^{IV}$ is the instrumented value of *Lerner*. Suitable instruments for Lerner must be relevant for explaining bank competition (the relevance condition) and should not influence bank risk through other channels apart from bank competition (the validity condition). As it is always difficult to find suitable instruments, I motivate the choice of the instruments with economic and statistical arguments. I report results using legal restrictions on entry into the banking industry (*Entry*) and legal restrictions (*Restrict*) on non-traditional bank activities as instruments for Lerner. I additionally check the robustness of the results to alternative instruments. I select *Entry* and *Restrict* as instruments because Claessens and Laeven (2004) and Barth et al. (2004) show that these two variables are the main determinants of bank competition in cross-country studies. In particular, they find that tighter restrictions on bank entry and on non-traditional bank activities are associated with lower competition in an international sample of 50 and 104 countries, respectively. I ensure that both instruments always have positive and statistically significant coefficients in the Lerner equation to verify that they pass the relevance condition. Regarding the validity condition, empirical literature suggests that bank competition is the main channel through which *Entry* and *Restrict* influence bank risk (Claessens and Laeven, 2004; Barth et al.,2004). Anyway, I check that both *Entry* and *Restrict* do not influence bank risk in any sample after controlling for their effect on bank competition. The Sargan test of over-identifying restrictions confirms in all the estimations the absence of correlation between these two instruments and the error term in the bank risk equations.

$X_{i,t-1}$ is the same set of bank-level control variables included in model [1]. $Z_{c,t-1}$ is the set of country-level control variables. The instruments are then included in $Y_{c,t-1}$ to estimate model [1] but are not included in $Z_{c,t-1}$ to estimate model [2]. Similar to model [1], B_i and β_t denote, respectively, bank- and year-fixed effects. Under this specification, β_2 would capture the effect of changes in creditor protection on bank risk through changes in bank competition and β_1 would capture the effect of changes in creditor protection on bank risk through channels apart from changes in bank competition. Finally, I use the Hausman endogeneity test to confirm the need for IV estimations and that they provide different results to estimations using the observed value of Lerner.

4. Empirical results

4.1. Changes in creditor rights and bank competition

I now analyze the effect of legal reforms of creditor rights in bankruptcy on bank competition. Table 2 reports the results for model [1]. Columns (1)-(2) report the results using the whole sample (all reforming versus all non-reforming countries). Columns (3)-(4) report the results excluding from the whole sample banks from countries suffering systemic and borderline banking crises over the analysis period. Such countries suffered a higher number of bank failures and authorities adopted intervention measures that might affect bank competition and confound the results. In particular, Calderon and Schaeck (2016) document increases in competition in these countries following government interventions in response to crises. Banks from France, Germany, Slovenia and Sweden are not

Table 2

Creditor rights in bankruptcy and bank competition. This table reports results for model [1]. The dependent variable is the annual bank Lerner index (*Lerner*). *Changebankruptcy* takes the value zero (one) for years before an increase (decrease) in creditor protection in bankruptcy laws, and one (zero) for years after the increase (decrease). It always takes the value zero for countries that do not experience any change in creditor rights. Bank and country-level control variables are defined in the Appendix (Table A1). The DID analysis compares different groups of banks: columns (1)-(2) compare reforming with all non-reforming countries; columns (3)-(4) exclude countries suffering systemic and borderline crises in the above two groups of countries, and columns (5)-(6) compare reforming countries with the propensity-score based control group. All regressions include year-fixed effects. Robust standard errors are in parentheses. ***, **, * indicate significance at 1%, 5%, and 10% respectively.

	Reforming versus all non-reforming countries		Reforming versus all non-reforming countries Excluding countries with systemic and borderline banking crises		Reforming versus matched countries	
	(1)	(2)	(3)	(4)	(5)	(6)
Changebankruptcy	−0.0049	−0.0076	−0.0296***	−0.0357***	−0.0296***	−0.0312***
	(0.0034)	(0.0055)	(0.0055)	(0.0091)	(0.0035)	(0.0045)
$Size_{t-1}$	−0.0106***	−0.0009***	−0.0039	−0.0001	−0.0079*	−0.0001
	(0.0023)	(0.0002)	(0.0051)	(0.0003)	(0.0041)	(0.0002)
$Liquidity_{t-1}$	−0.0603***	−0.0160***	0.0138	0.0004	−0.0224**	−0.0066*
	(0.0067)	(0.0026)	(0.0120)	(0.0059)	(0.0110)	(0.0036)
$Interest\ income_{t-1}$	0.0033**	0.0019	−0.0038	−0.0037*	0.0026	0.0005
	(0.0014)	(0.0015)	(0.0043)	(0.0021)	(0.0038)	(0.0017)
$Overhead\ costs_{t-1}$	−0.0804***	−0.0582***	−0.0409	−0.0198	−0.0095	−0.0049
	(0.0055)	(0.0075)	(0.0493)	(0.0158)	(0.424)	(0.0104)
$Entry_{t-1}$	0.0090***	0.0089***	0.0067***	0.0068***	0.0126***	0.0128***
	(0.0016)	(0.0017)	(0.0023)	(0.0020)	(0.0024)	(0.0014)
$Restrict_{t-1}$	0.0093***	0.0095***	0.0049***	0.0051***	0.0078***	0.0077***
	(0.0011)	(0.0013)	(0.0014)	(0.0014)	(0.0014)	(0.0013)
$Concentration_{t-1}$	0.0006***	0.0006***	−0.0001	−0.0002	0.0006***	0.0005***
	(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0001)	(0.0002)
KKZ_{t-1}	0.1412***	0.1401***	−0.0115	−0.0141	0.0786***	0.0807**
	(0.0142)	(0.0289)	(0.0192)	(0.0313)	(0.0225)	(0.0375)
$Capital\ stringency_{t-1}$	−0.0039***	−0.0035***	−0.0131***	−0.0131***	−0.0074***	−0.0072***
	(0.0006)	(0.0006)	(0.0012)	(0.0012)	(0.0009)	(0.0008)
$Official\ supervisión_{t-1}$	0.0043***	0.0050***	0.0068***	0.0065***	0.0142***	0.0142***
	(0.0005)	(0.0006)	(0.0009)	(0.0009)	(0.0010)	(0.0011)
$Government\ spending_{t-1}$	−0.0020***	−0.0022***	0.0005**	0.0005***	−0.0002	−0.0003
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0004)
$Bank\ development_{t-1}$	0.0007***	0.0007***	0.0002	−0.0001	−0.0011***	−0.0012***
	(0.0001)	(0.0002)	(0.0003)	(0.0004)	(0.0002)	(0.0002)
$Equity\ market\ development_{t-1}$	0.0001**	0.0001**	0.0003***	0.0002*	0.0011***	0.0011***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0002)
$GDPgrowth_{t-1}$	0.0058***	0.0065***	0.0021***	0.0019***	0.0019***	0.0021***
	(0.0003)	(0.0003)	(0.0006)	(0.0007)	(0.0004)	(0.0005)
$LnGDPpc_{t-1}$	−0.6105***	−0.6222***	−0.2623***	−0.2466***	−0.0592*	−0.0619*
	(−0.0200)	(0.0257)	(0.0410)	(0.0503)	(0.0307)	(0.0338)
Bank-fixed effects	Yes	No	Yes	No	Yes	No
Year-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country-fixed effects	No	Yes	No	Yes	No	Yes
Cluster bank level	No	Yes	No	Yes	No	Yes
R^2	0.4903	0.7444	0.1473	0.7588	0.2150	0.7571
# observations	9,849	9,849	3,639	3,639	3,578	3,578
# banks	2,223	2,223	899	899	817	817
# countries	68	68	49	49	30	30

included in the treatment group. Banks from Austria, Belgium, Greece, Hungary, Ireland, Italy, Kazakhstan, Latvia, Luxembourg, Netherlands, Nigeria, Portugal, Russia, Spain, and Switzerland are not included in the control group. Finally, columns (5)-(6) report the results using the propensity-score based group instead of all non-reforming countries as the control group.

The coefficients of *Changebankruptcy* are negative in all the estimations. They are statistically significant at the one percent level in columns (3)-(6), and they are non-significant at conventional levels in columns (1)-(2) when I use banks in all non-reforming countries as the control group. The results are similar using both bank-fixed effects and country-fixed effects with clusters of standard errors at the bank level. The significant negative coefficients in columns (3)-(6) suggest that increases (decreases) in creditor rights in bankruptcy laws are associated with reductions (increases) in bank market power or increases (reductions) in bank competition. The economic impact is also significant in the sample excluding countries with systemic and borderline banking crises or when I use the matched control group. For instance, using the coefficients in column (5), banks reduce their Lerner index by 2.96 percentage points after the increase by 1 in creditor protection in bankruptcy relative to banks in the matched control group. The increase in bank competition after a strengthening of creditor rights in bankruptcy is consistent with H1. The greater bank credit supply and the lower bank credit demand may motivate this change in the degree of bank competition after increases in creditor rights.

Regarding country-level control variables, the positive coefficients of *Entry* and *Restrict* in all the estimations suggest, similar to Barth et al. (2004) and Claessens and Laeven (2004), that tighter restrictions on bank entry and on non-traditional activities are associated with stronger bank market power or less bank competition. I also find that more official supervision, more equity market development, and higher GDP growth are associated with stronger bank market power. These results are robust because *Restrict*, *Entry*, *Official supervision, Equity market development,* and *GDP growth* have positive and statistically significant coefficients at the one per cent level in all the estimations. Higher bank concentration and better institutional quality are also positively associated with bank market power because they have positive and significant coefficients in four estimations and their coefficients are only insignificant when I exclude banks from countries suffering systemic and borderline banking crises. *Capital stringency* and GDP per capita are associated with lower bank market power because they have negative and significant coefficients in all the estimations. The results for *Government spending* and *Bank development* are mixed because the sign of their coefficients varies depending on the sample of banks.

Table 3 reports the robustness of the results when I exclude from the treatment group banks from countries that also change the

Table 3

Creditor rights in bankruptcy and bank competition. Excluding countries with a change in collateral law. This table reports results for model [1]. The dependent variable is the annual bank Lerner index (*Lerner*). *Changebankruptcy* takes the value zero (one) for years before an increase (decrease) in creditor protection in bankruptcy laws, and one (zero) for years after the increase (decrease). It always takes the value zero for countries that do not experience any change in creditor rights. Banks in countries experiencing a change in collateral law over the 2005–2013 period are excluded from the treatment group. Bank and country-level control variables are defined in the Appendix (Table A1). The DID analysis compares different groups of banks: columns (1)-(2) compare reforming with all non-reforming countries; columns (3)-(4) exclude countries suffering systemic and borderline crises in the above two groups of countries, and columns (5)-(6) compare reforming countries with the propensity-score based control group. All regressions include year-fixed effects. Robust standard errors are in parentheses. ***, **, * indicate significance at 1%, 5%, and 10% respectively.

	Reforming versus all non-reforming countries		Reforming versus all non-reforming countries Excluding countries with systemic and borderline banking crises		Reforming versus matched countries	
	(1)	(2)	(3)	(4)	(5)	(6)
Changebankruptcy	−0.0006	−0.0067	−0.0299***	−0.0400***	−0.0151***	−0.0172**
	(0.0053)	(0.0118)	(0.0084)	(0.0400)	(0.0047)	(0.0077)
$Size_{t-1}$	−0.0089***	−0.0008***	0.0016	0.0001	0.0010	−0.0002
	(0.0025)	(0.0002)	(0.0058)	(0.0003)	(0.0041)	(0.0003)
$Liquidity_{t-1}$	−0.0558***	−0.0147***	0.0025	−0.0033	−0.0791***	−0.0200***
	(0.0072)	(0.0027)	(0.0135)	(0.0061)	(0.0121)	(0.0040)
$Interest\ income_{t-1}$	0.0031**	0.0018	−0.0040	−0.0039	−0.0229**	−0.0090**
	(0.0015)	(0.0014)	(-0.0058)	(0.0031)	(0.0110)	(0.0041)
$Overhead\ costs_{t-1}$	−0.0740***	−0.0540***	−0.0500	−0.0309	−0.0002	−0.0191
	(0.0057)	(0.0072)	(-0.0524)	(0.0199)	(0.0360)	(0.0247)
$Entry_{t-1}$	0.0089***	0.0090***	0.0052***	0.0056**	0.0394***	0.0364***
	(0.0019)	(0.0025)	(0.0030)		(0.0062)	(0.0057)
				(0.0026)		
$Restrict_{t-1}$	0.0094***	0.0096***	0.0051***	0.0054***	0.0077***	0.0074***
	(0.0012)	(0.0015)	(0.0015)	(0.0014)	(0.0020)	(0.0021)
$Concentration_{t-1}$	0.0007***	0.0006***	−0.0006***	−0.0006***	0.0001	−0.0001
	(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
KKZ_{t-1}	0.1903***	0.1863***	0.0310	0.0233	0.2805***	0.2885***
	(0.0153)	(0.0312)	(0.0220)	(0.0330)	(0.0283)	(0.0339)
$Capital\ stringency_{t-1}$	−0.0017**	−0.0012	−0.0141***	−0.01395***	−0.0068***	−0.0074***
	(0.0008)	(0.0008)	(0.0014)	(0.0014)	(0.0015)	(0.0018)
$Official\ supervisión_{t-1}$	0.0034***	0.0040***	0.0075***	0.0072***	−0.0009	−0.0013
	(0.0005)	(0.0007)	(0.0010)	(0.0009)	(0.0014)	(0.0017)
$Government\ spending_{t-1}$	−0.0020***	−0.0021***	0.0006**	0.0005***	−0.0003	−0.0006*
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0003)	(0.0003)
$Bank\ development_{t-1}$	0.0009***	0.0009***	0.0005	0.0002	0.0002	0.0004
	(0.0001)	(0.0002)	(0.0003)	(0.0004)	(0.0003)	(0.0003)
$Equity\ market\ development_{t-1}$	−0.0002**	−0.0002**	−0.0002*	−0.0003**	−0.022***	−0.0023***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0003)	(0.0003)
$GDPgrowth_{t-1}$	0.0059***	0.0065***	0.0027***	0.0024***	0.0031***	0.0033***
	(0.0003)	(0.0004)	(0.0007)	(0.0007)	(0.0007)	(0.0009)
$LnGDPpc_{t-1}$	−0.7257***	−0.7325***	−0.3847***	−0.3395***	−0.1802***	−0.1508**
	(-0.0234)	(0.0305)	(0.0497)	(0.0521)	(0.0461)	(0.0692)
Bank-fixed effects	Yes	No	Yes	No	Yes	No
Year-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country-fixed effects	No	Yes	No	Yes	No	Yes
Cluster bank level	No	Yes	No	Yes	No	Yes
R^2	0.5134	0.7424	0.1600	0.7581	0.2668	0.8542
# observations	8,697	8,697	3,041	3,041	1,659	1,659
# banks	1,960	1,960	753	753	379	379
# countries	60	60	43	43	14	14

protection of collateral outside bankruptcy. By focusing on the seven countries that change their bankruptcy law but not their collateral law, I avoid potential confounding effects caused by changes in creditor rights outside bankruptcy. The results in Table 3 remain similar to those reported in Table 2. The coefficients of *Changebankruptcy* are negative in all the estimations and statistically significant in columns (3)-(6). They are again non-significant at conventional levels only when I use all the non-reforming countries as the control group. However, the coefficients of *Changebankruptcy* are negative and statistically significant, mostly at the one percent level, when I exclude banks in countries suffering systemic and borderline crises and when I use the propensity-score based control group.

4.2. Parallel trends and exogeneity conditions

I now check that the analysis meets the two conditions required to apply DID tests. First, the "parallel trends" condition implies that bank competition behaves similarly in the treatment and control groups before the treatment. Second, legal changes in creditor rights should be exogenous with respect to bank competition, or changes in creditor rights should be for reasons other than changes in the level of bank competition.

The parallel trends condition requires similar trends for both groups of banks but not similar levels of bank competition. Graphs 1, 2, and 3 show the time evolution of bank competition for treatment and control groups. I only consider the period before the change in creditor rights for the treatment group. Therefore, banks are dropped from the analysis once the country experiences a legal change in creditor rights. As the latest legal change in creditor protection in bankruptcy took place in 2011 in Serbia, I compare the Lerner index between the treatment and control groups up to 2010.

Graph 1, comparing the time evolution of the Lerner index between reforming and all non-reforming countries, shows the lower similarity of trends between the treatment and the control group. The Lerner index increases in 2005–2006, and continuously decreases after 2006 in the sample of all non-reforming countries but remains relatively stable between 2004 and 2009, and increases in 2010 in reforming countries. However, the treatment and control groups have similar trends in Graphs 2 and 3. These graphs suggest that the samples of reforming and non-reforming banks excluding banks from countries with systemic and borderline banking crises or using the propensity-score based group of banks as the control group are the most suitable for the DID analysis.

I additionally need to verify that changes in creditor rights are exogenous to bank competition. This condition is not guaranteed ex
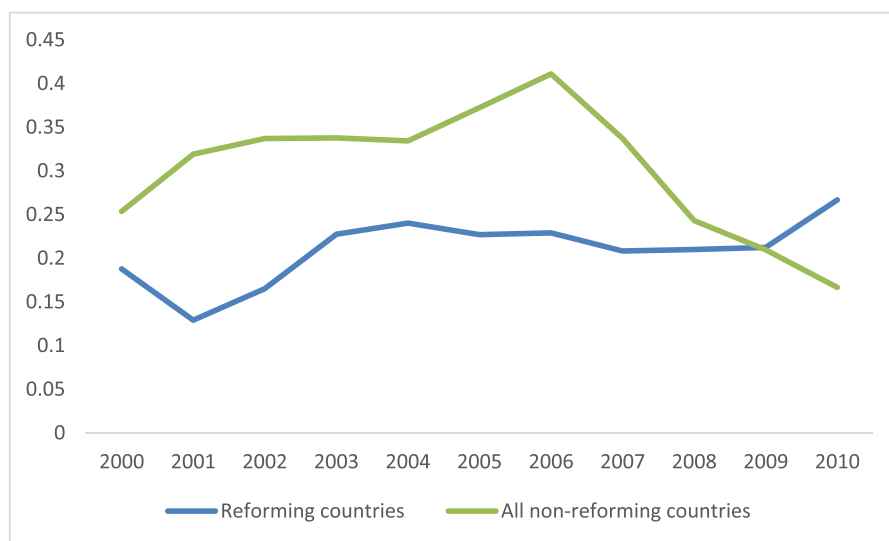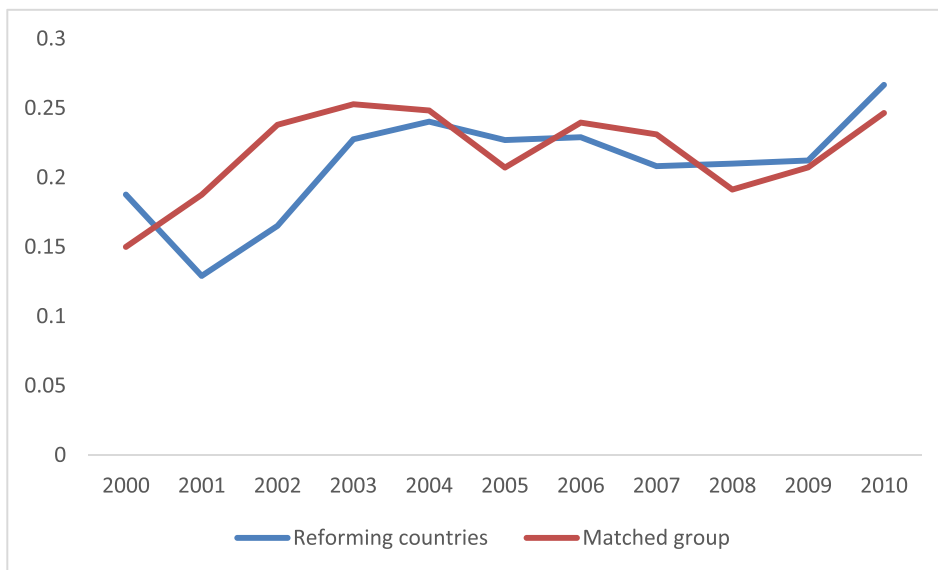

Graph 1. Lerner index in reforming and all non-reforming countries.
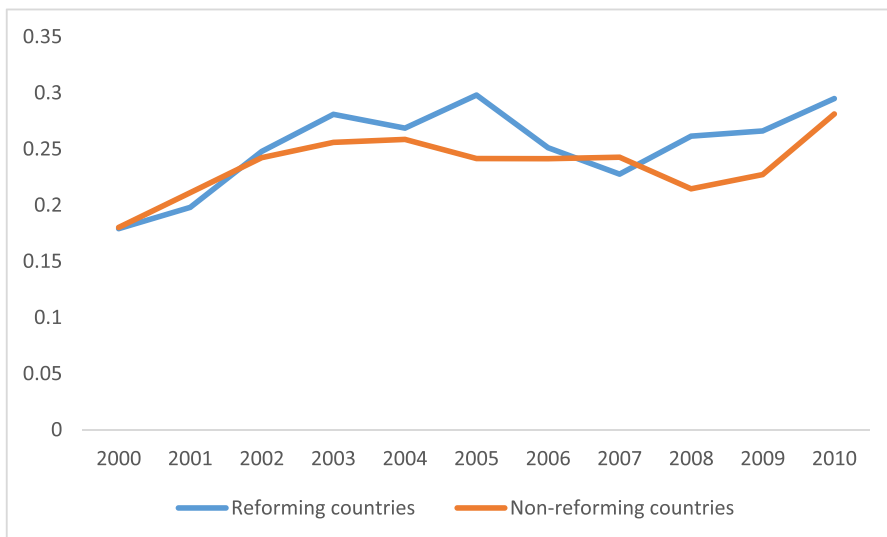
29

Graph 2. Lerner index in reforming and non-reforming countries excluding countries with systemic and borderline crises.

Graph 3. Lerner index in reforming and matched countries.

Table 4

Creditor rights in bankruptcy and bank competition. Dynamic analysis. This table reports results for model [1]. The dependent variable is the annual bank Lerner index (*Lerner*). *Changebankruptcy* (-2, −1) captures any effects from two years before to a year before the change in creditor protection in bankruptcy laws; *Changebankruptcy* (0,1) captures the effect in the year of the change and the year after the change; *Changebankruptcy* (>2) captures the effect two years after the change and beyond. Bank and country-level control variables are defined in Appendix A (Table A1). The results compare different groups of banks: columns (1)-(2) compare reforming with all non-reforming countries; columns (3)-(4) exclude countries suffering systemic and borderline crises in the above two groups of countries, and columns (5)-(6) compare reforming countries with the propensity-score based control group. All regressions include year-fixed effects. Robust standard errors are in parentheses. ***, **, * indicate significance at 1 %, 5 %, and 10 % respectively.

	Reforming versus all non-reforming countries		Reforming versus all non-reforming countries Excluding countries with systemic and borderline banking crises		Reforming versus matched countries	
	(1)	(2)	(3)	(4)	(5)	(6)
Changebankruptcy (-2,-1)	0.0502***	0.0585***	0.0121	0.0181	−0.0006	0.0046
	(0.0071)	(0.0101)	(0.0106)	(0.0118)	(0.0075)	(0.0109)
Changebankruptcy (0,1)	−0.0111**	−0.0187*	−0.0415***	−0.0521***	−0.0236***	−0.0299***
	(0.0055)	(0.0113)	(0.0084)	(0.0153)	(0.0054)	(0.0094)
Changebankruptcy (>=2)	−0.0320***	−0.0315***	0.0075	0.0097	−0.0080	−0.0052
	(0.0052)	(0.0061)	(0.0092)	(0.0093)	(0.0051)	(0.0060)
$Size_{t-1}$	−0.0102***	−0.0009***	−0.0041	−0.0002	−0.0075*	−0.0001
	(0.0023)	(0.0002)	(0.0051)	(0.0003)	(0.0041)	(0.0002)
$Liquidity_{t-1}$	−0.0577***	−0.0153***	0.0151	0.0008	−0.0217**	−0.0064*
	(0.0067)	(0.0026)	(0.0120)	(0.0060)	(0.0110)	(0.0036)
$Interest\ income_{t-1}$	0.0031**	0.0017	−0.0040	−0.0039*	0.0025	0.0004
	(0.0014)	(0.0015)	(0.0043)	(0.0022)	(0.0037)	(0.0016)
$Overhead\ costs_{t-1}$	−0.0783***	−0.0568***	0.0.0472	−0.0233	−0.0054	−0.0046
	(0.0055)	(0.0073)	(0.0494)	(0.0153)	(0.0415)	(0.0102)
$Entry_{t-1}$	0.0088***	0.0086***	0.0064***	0.0064***	0.0131***	0.0129***
	(0.0016)	(0.0017)	(0.0023)	(0.0021)	(0.0024)	(0.0016)
$Restrict_{t-1}$	0.0095***	0.0097***	0.0048***	0.0050***	0.0078***	0.0078***
	(0.0011)	(0.0013)	(0.0014)	(0.0014)	(0.0014)	(0.0013
$Concentration_{t-1}$	0.0007***	0.0006***	−0.0001	−0.0002	0.0006***	0.0005***
	(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0001)	(0.0001)
KKZ_{t-1}	0.1215***	0.1180***	−0.0157	−0.0208	0.0755***	0.0786**
	(0.0143)	(0.0293)	(0.0194)	(0.0313)	(0.0226)	(0.00387
$Capital\ stringency_{t-1}$	−0.0040***	−0.0037***	−0.0133***	−0.0133**	−0.0073***	−0.0072***
	(0.0006)	(0.0007)	(0.0013)	(0.0013)	(0.0009)	(0.0008)
$Official\ supervisión_{t-1}$	0.0043***	0.0050***	0.0069***	0.0066***	0.0142***	0.0143***
	(0.0005)	(0.0006)	(0.0009)	(0.0009)	(0.0011)	(0.0011)
$Government\ spending_{t-1}$	−0.0021***	−0.0022***	0.0006**	0.0006***	−0.0002	−0.0003
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0003)
$Bank\ development_{t-1}$	0.0009***	0.0008***	0.0003	−0.0001	−0.0011***	−0.0012***
	(0.0001)	(0.0002)	(0.99)	(0.0004)	(0.0002)	(0.0002)
$Equity\ market\ development_{t-1}$	0.0001**	0.0001	0.0002**	0.0002	0.0012***	0.0011***
	(0.0001)	(0.0001)	(0.0003)	(0.0001)	(0.0001)	(0.0002)
$GDPgrowth_{t-1}$	0.0059***	0.0067***	0.0022***	0.0022***	0.0019***	0.0022***
	(0.0003)	(0.0004)	(0.0006)	(0.0007)	(0.0004)	(0.0006)
$LnGDPpc_{t-1}$	−0.5876***	−0.5934***	−0.2668***	−0.2550	−0.0616**	−0.0586
	(0.0202)	(0.0255)	(0.0417)	(0.0499)	(0.0314)	(0.0395)
Bank-fixed effects	Yes	No	Yes	No	Yes	No
Year-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country-fixed effects	No	Yes	No	Yes	No	Yes
Cluster bank level	No	Yes	No	Yes	No	Yes
R^2	0.4946	0.7469	0.1484	0.7595	0.2159	0.7572
# observations	9,849	9,849	3,639	3,639	3,578	3,578
# banks	2,223	2,223	899	899	817	817
# countries	68	68	49	49	30	30

ante and creditor rights may be endogenous. For instance, high bank competition, or low bank market power, do not provide incentives to create long-term relationships between banks and debtors (Petersen and Rajan, 1994, 1995; Dell'Ariccia and Marquez, 2004). In this scenario, authorities might find it suitable to strengthen creditor rights to improve the terms on which banks provide credit and then use creditor rights as substitutes for lending relationships to reduce conflicts between banks and borrowers. In this case, there would be a negative relationship between bank market power and creditor rights, but the causality would run from bank market power to creditor rights. I now follow Bertrand and Mullainathan (2003) and Acharya and Subramanian (2009) to test the exogeneity of changes in creditor rights. I analyze the dynamic effect of changes in creditor rights by breaking down the creditor rights change variable into three separate time periods: *Changebankruptcy(-2,-1)*, which captures any effects from two years to one year before the change; (ii) *Changebankruptcy(0,1)*, which captures the effect in the year of the change and the year after the change; and (iii) *Changebankruptcy (>=2)*, which captures the effect two years after the change and beyond. If the change in creditor rights was made to increase credit supply depending on bank market power, then we might see an "effect" of the change even prior to the change itself. Therefore, the coefficients of *Changebankruptcy(-2,-1)* should be insignificant to verify the exogeneity assumption.

Table 4 reports the results. The coefficients of *Changebankruptcy(-2,-1)* are non-significant in columns (3)-(4) and (5)-(6) when I, respectively, exclude countries suffering systemic and borderline banking crises and when I use the matched sample control group. Moreover, the coefficients in these estimations of *Changebankruptcy(0,1)* are negative and significant and the coefficients of *Changebankruptcy(>=2)* are non-significant in these columns. These coefficients are consistent with causality running from changes in creditor rights to bank market power. However, the coefficients of *Changebankruptcy(-2,-1)* are positive and significant in columns (1)-(2) when I use all non-reforming countries as the control group. These positive coefficients suggest that bank market power increased two years before the change in creditor rights and do not allow us to rule out that the subsequent change in creditor rights was not caused by the increase in bank market power. The results of this dynamic analysis are consistent with the analysis of parallel trends in Graphs 1–3. Both analyses suggest the advisability of using the results reported in columns (3)-(6) of Tables 2 and 3, excluding countries suffering systemic and borderline crises or using the propensity-score based control group, as the main results. These results indicate a statistically significant reduction (increase) in bank market power after a strengthening (weakening) of creditor rights in bankruptcy. The results in Table 4 also confirm that selecting a matched group of countries using a propensity-score based technique is useful for defining a control group of non-reforming countries that are similar to reforming countries before the change and, therefore, for reducing endogeneity concerns.

4.3. Changes in creditor rights and bank competition: Differences across countries

I now analyze whether the impact of a change in bankruptcy law on bank competition varies across countries depending on other regulatory characteristics. In particular, I test hypothesis H2 and analyze how legal restrictions on bank entry and on non-traditional bank activities shape the effect of creditor rights on bank competition. The motivation for this analysis is that I expect less changes in bank competition following changes in creditor rights in countries where regulatory characteristics do not promote bank competition. Therefore, if tighter restrictions on entry and non-traditional bank activities limit bank competition following findings by Claessens and Laeven (2004) and Barth et al. (2004), they might also reduce the impact of any change in creditor rights on bank competition. I now include in the regressions an interaction term between the change in creditor rights and *Entry* and *Restrict* to test how legal restrictions on, respectively, bank entry and non-traditional bank activities shape the influence of creditor rights on bank competition.

Table 5 reports the results. The coefficients of *Changebankruptcy* are negative and the coefficients of the interaction term of *Changebankruptcy* with *Entry* and *Restrict* are positive and significant in all the estimations. These results indicate that the reduction (increase) in market power following an increase (reduction) in creditor rights in bankruptcy is lower in countries with tighter legal restrictions on bank entry and non-traditional bank activities. They are consistent with hypothesis H2. Tighter restrictions on these aspects limit bank competition and, therefore, any change in bank competition following regulatory reforms in creditor rights. These results are the same whatever the control group I use and when I simultaneously include both interaction terms of *Changebankruptcy* with *Entry* and *Restrict* in the regressions. Although not reported to save space, the results are similar when regressions include country-fixed effects and the cluster of standard errors at the bank level instead of including bank-fixed effects, and when I exclude from the treatment groups banks in countries that also experience changes in collateral law.

Table 5

Creditor rights in bankruptcy and bank competition: Differences across countries. This table reports results for model [1]. The dependent variable is the annual bank Lerner index (*Lerner*). *Changebankruptcy* takes the value zero (one) for years before an increase (decrease) in creditor protection in bankruptcy laws, and one (zero) for years after the increase (decrease). It always takes the value zero for countries that do not experience any change in creditor rights. *Entry* measures the country's legal restriction on bank entry. *Restrict* is an indicator of the country's legal restrictions on non-traditional bank activities. Bank and country-level control variables are defined in Appendix A (Table A1). The results compare different groups of banks: columns (1)-(2) compare reforming with all non-reforming countries; columns (3)-(4) exclude countries suffering systemic and borderline crises in the above two groups of countries, and columns (5)-(6) compare reforming countries with the propensity-score based control group. All regressions include bank and year-fixed effects. Robust standard errors are in parentheses. ***, **, * indicate significance at 1%, 5%, and 10% respectively.

	Reforming versus all non-reforming countries			Reforming versus all non-reforming countries Excluding countries with systemic and borderline banking crises			Reforming versus matched countries		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Changebankruptcy	−0.3008***	−0.2266***	−0.3995***	−0.1959***	−0.1945***	−0.3515***	−0.2499***	−0.1455**	−0.3149***
	(0.0287)	(0.0104)	(0.0283)	(0.0386)	(0.0131)	(0.0390)	(0.0311)	(0.0105)	(0.0310)
Changebankruptcy * Entry	0.0441***		0.0276***	0.0237***		0.0225***	0.0323***		0.0260***
	(0.0042)		(0.0042)	(0.0054)		(0.0053)	(0.0045)		(0.0045)
Changebankruptcy *Restrict		0.0362***	0.0342***		0.0256***	0.0255**		0.0190***	0.0178***
		(0.0016)	(0.0016)		(0.0257)	(0.0018)		(0.0016)	(0.0016)
Size$_{t-1}$	−0.0115***	−0.0108***	−0.0113***	−0.0061	−0.0054	−0.0074	−0.0098**	0.0087**	−0.0101**
	(0.0023)	(0.0023)	(0.0023)	(0.0052)	(0.0050)	(0.0050)	(0.0041)	(0.0040)	(0.0040)
Liquidity$_{t-1}$	−0.0592***	−0.0528***	−0.0525***	0.0103	0.0180	0.0147	−0.0245**	−0.0154	−0.0176*
	(0.89)	(0.0065)	(0.0064)	(0.0120)	(0.0116)	(0.0115)	(0.0109)	(0.0108)	(0.0107)
Interest income$_{t-1}$	0.0032**	0.0029**	0.0028**	−0.0035	−0.0052	−0.0050	0.0021	0.0009	0.0006
	(0.0066)	(0.0014)	(0.0013)	(0.0043)	(0.0042)	(0.0042)	(0.0038)	(0.0037)	(0.0036)
Overhead costs $_{t-1}$	−0.0770***	−0.0757***	−0.0738***	−0.0313	−0.0795*	−0.0702	0.0002	−0.0343	−0.0249
	(0.0055)	(0.0053)	(0.0053)	(0.0492)	(0.0477)	(0.0476)	(0.0421)	(0.0415)	(0.0413)
Entry $_{t-1}$	0.0112***	0.00091***	0.0105***	0.0074***	0.0048**	0.0055**	0.0159***	0.0127***	0.0153***
	(0.0016)	(0.0016)	(0.0015)	(0.0023)	(0.0022)	(0.0022)	(0.0024)	(0.0023)	(0.0024)
Restrict $_{t-1}$	0.0104***	0.0105***	0.0111***	0.0057***	0.0060***	0.0066***	0.0085***	0.0086***	0.0091***
	(0.0011)	(0.0011)	(0.0011)	(0.0014)	(0.0014)	(0.0014)	(0.0014)	(0.0014)	(0.0014)
Concentration $_{t-1}$	0.0007***	0.0008***	0.0008***	−0.00002	−0.0001	−0.00001	0.0008***	0.0006***	0.0008***
	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0001)	(0.0001)
KKZ $_{t-1}$	0.1394***	0.1230***	0.1229***	−0.0169	−0.0321*	−0.0372**	0.0754***	0.0651***	0.0634***
	(0.0141)	(0.0137)	(0.0137)	(0.0192)	(0.0186)	(0.0185)	(0.0223)	(0.0220)	(0.0219)
Capital stringency $_{t-1}$	−0.0032***	−0.0025***	−0.0022***	−0.0128***	−0.0131***	−0.01278***	−0.0062***	−0.0064***	−0.0055***
	(0.0006)	(0.0006)	(0.0006)	(0.0012)	(0.0012)	(0.0012)	(0.0009)	(0.0009)	(0.0009)
Official supervisión $_{t-1}$	0.0041***	0.0036***	0.0035***	0.0066***	0.0068***	0.0067***	0.0144***	0.0137***	0.0139***
	(0.0005)	(0.0005)	(0.0005)	(0.0009)	(0.0009)	(0.0009)	(0.0010)	(0.0010)	(0.0010)
Government spending $_{t-1}$	−0.0020***	−0.0017***	−0.0017***	0.0006***	0.0008***	0.0009***	0.00005	0.0001	0.0002
	(−11.59)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Bank development $_{t-1}$	0.0007***	0.0008***	0.0008***	0.0003	0.0006**	0.0006**	−0.0008***	−0.0006***	−0.0004
	(0.0002)	(0.0001)	(0.0001)	(0.0003)	(0.0003)	(0.0003)	(0.0002)	(0.0002)	(0.0002)
Equity market development$_{t-1}$	0.0002***	0.0001*	0.0001**	0.0004***	0.0002*	0.0003***	0.0015***	0.0010***	0.0013***
	(0.0001)	(0.0001)	(2.48)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
GDPgrowth $_{t-1}$	0.0058***	0.0058***	0.0058***	0.0022***	0.0026***	0.0027***	0.0023***	0.0022***	0.0025***
	(0.0003)	(9.16)	(0.0001)	(0.0006)	(0.0006)	(0.0006)	(0.0004)	(0.0004)	(0.0004)
LnGDPpc $_{t-1}$	−0.6548***	−0.6966***	−0.07195***	−0.2593***	−0.3520***	−0.3486***	−0.1297***	−0.1684***	−0.2180***
	(0.0203)	(−0.0001)	(0.0200)	(0.0409)	(0.0402)	(0.0401)	(0.0320)	(0.0314)	(0.0324)
Bank-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-fixed effects	No	No	No	No	No	No	No	No	No
Cluster bank level	No	No	No	No	No	No	No	No	No
R^2	0.4974	0.5222	0.5249	0.1532	0.2032	0.2085	0.2293	0.2525	0.2616
# observations	9,849	9,849	9,849	3,639	3,639	3,639	3,578	3,578	3,578
# banks	2,223	2,223	2,223	899	899	899	817	817	817
# countries	68	68	68	49	49	49	30	30	30

4.4. Changes in creditor rights, bank competition and risk

In this section, I analyze if the change in bank competition following a reform in bankruptcy law impacts on bank risk. The traditional competition-fragility view suggests a positive relationship between bank competition and risk. Following this view, Hypothesis H3 suggests that the more stronger creditor rights increase bank competition, the more they will increase default rates and bank risk.

I estimate model [2] using IV regressions and Table 6 reports the results. I use the forecasted values of Lerner from a first stage using *Restrict* and *Entry* as instruments. I use several tests for the validity of the instruments and IV estimations. First, in the Hausman endogeneity test, the null hypothesis is that IV and OLS estimations are not statistically different. The Hausman test rejects the null hypothesis in all the specifications and confirms endogeneity concerns. Second, in the Sargan test, the null hypothesis is that the

Table 6

Creditor rights in bankruptcy, bank competition and risk This table reports results for model [2]. I use two dependent variables: the bank's Z-score (*Z-score*), and the ratio of non-performing loans to total loans (*Non-performing loans*). *Changebankruptcy* takes the value zero (one) for years before an increase (decrease) in creditor protection in bankruptcy, and one (zero) for years after the increase (decrease). It always takes the value zero for countries that do not experience any change in creditor rights. *Lerner*^{IV} is the instrumented annual bank Lerner index. *Restrict* and *Entry* are the instruments of Lerner. Bank and country-level control variables are defined in Appendix A (Table A1). The results compare different groups of banks: columns (1)-(2) compare reforming with all non-reforming countries; columns (3)-(4) exclude countries suffering systemic and borderline crises in the above two groups of countries, and columns (5)-(6) compare reforming countries with the propensity-score based control group. All regressions include bank and year-fixed effects. Robust standard errors are in parentheses. ***, **, * indicate significance at 1%, 5%, and 10% respectively.

	Reforming versus all non-reforming countries		Reforming versus all non-reforming countries Excluding countries with systemic and borderline banking crises		Reforming versus matched countries	
	Z-score	Non-performing loans	Z-score	Non-performing loans	Z-score	Non-performing loans
	(1)	(2)	(3)	(4)	(5)	(6)
Changebankruptcy	0.0740***	−0.0340	0.1106***	−1.0490	0.0983***	−2.2527**
	(0.0740)	(0.3865)	(0.0364)	(0.7252)	(0.0217)	(0.8810)
Lerner^{IV}	0.9168**	−34.1397***	1.9863**	−38.7657***	1.3779***	−57.2352***
	(0.4085)	(9.5922)	(0.8953)	(13.7323)	(0.5331)	(17.7003)
Size$_{t-1}$	−0.0027	−0.2336	0.0079	0.1785	−0.0141	−0.7841
	(0.0104)	(02675)	(0.0212)	(0.4916)	(0.0185)	(0.8245)
Liquidity$_{t-1}$	−0.0053	−2.9837***	−0.2168***	−0.6578	−0.0863*	−2.3289
	(0.0369)	(1.0302)	(0.0500)	(1.1054)	(0.0502)	(1.5558)
Interest income$_{t-1}$	−0.0064	0.4046***	−0.0168	1.2984***	−0.0347**	1.4014***
	(0.0058)	(0.1297)	(0.0179)	(0.3211)	(0.0168)	(0.3664)
Overhead costs $_{t-1}$	0.0686*	−2.1323***	−0.6298***	8.1343*	−0.8190***	4.3884
	(0.0398)	(0.7957)	(0.2053)	(4.3185)	(0.0187)	(5.0717)
Concentration $_{t-1}$	−0.00009	0.0167	0.0025***	−0.0085	0.0014*	0.0543**
	(0.0004)	(0.0123)	(0.0007)	(0.0186)	(0.0007)	(0.0234)
KKZ $_{t-1}$	0.0118	1.7534	0.0638	−2.3400	−0.1508	−1.1592
	(0.0818)	(1.7299)	(0.0792)	(1.6048)	(0.1044)	(2.7393)
Capital stringency $_{t-1}$	−0.00006	−0.1277	0.0298**	−0.7835***	0.0057	−0.6993***
	(0.0030)	(0.0999)	(0.0127)	(0.2817)	(0.0053)	(0.2528)
Official supervisión $_{t-1}$	0.0001	0.1145*	−0.0189***	0.3228**	−0.0178*	0.9897***
	(0.0027)	(0.0603)	(0.0071)	(0.1323)	(0.0091)	(0.2482)
Government spending $_{t-1}$	0.0049***	−0.0902***	−0.003	0.0502**	0.0002	0.0751***
	(0.0011)	(0.0337)	(0.0010)	(0.0243)	(0.0010)	(0.0261)
Bank development $_{t-1}$	−0.0044***	0.0812***	−0.0103***	0.1402***	−0.0028**	0.0719
	(0.0005)	(0.0140)	(0.0012)	(0.0244)	(0.0011)	(0.0511)
Equity market development$_{t-1}$	0.0009***	−0.0157**	0.0004	−0.0111	−0.0004	0.0852***
	(0.0002)	(0.0070)	(0.0005)	(0.0095)	(0.0009)	(0.0259)
GDPgrowth $_{t-1}$	−0.0046*	0.1397**	−0.0056*	−0.0837	0.0001	0.0435
	(0.0027)	(0.0686)	(0.0031)	(0.0556)	(0.0022	(0.0591)
LnGDPpc $_{t-1}$	0.6270**	−15.1436**	0.3439	2.5651	0.3551***	−10.6324*
	(0.2624)	(7.0341)	(0.2877)	(4.7117)	(0.1384)	(5.8644)
Bank-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country-fixed effects	No	No	No	No	No	No
Cluster bank level	No	No	No	No	No	No
Endogeneity test (p-value)	0.0001	0.0000	0.0018	0.0000	0.0196	0.0000
Sargan test (p-value)	0.6384	0.7381	0.1723	0.1808	0.1336	0.6809
R^2	0.2260	0.0278	0.1459	0.040	0.2200	0.0202
# observations	9,849	6,970	3,639	3,725	3,578	2,114
# banks	2,223	1,730	899	733	817	561
# countries	68	67	49	48	30	29

instruments are valid, i.e., there is no correlation between the instruments and the error term. The non-significant values of the Sargan test in all the estimations indicate that the null hypothesis is not rejected and, therefore, restrictions on entry into banking and restrictions on non-traditional bank activities are appropriate instruments for bank competition because they are not correlated with the error term and are correctly excluded from the Lerner equation.[8]

The coefficients of *Lerner^IV* are positive in the *Z-score* equations and negative in the *Non-performing loans* equations. All of them are statistically significant at conventional levels. These coefficients indicate that the reduction (increase) in bank market power, following an increase (decrease) in creditor rights, on average increases bank risk because it is associated with a lower Z-score and higher ratios of non-performing loans for banks. This result is consistent with hypothesis H3., i.e., with an increase in bank competition following a strengthening of creditor rights that increases the expected default rates, but not recovery rates, as a consequence of the higher bank risk-taking incentives encouraged by competition. This result indicates that bank competition is a channel through which creditor rights impact on bank risk.

Changebankruptcy has positive and significant coefficients in the *Z-score* equations and mostly non-significant coefficients in the *Non-performing loans* equations. Only the negative coefficient of *Changebankruptcy* in column (6), when I use the matched control group, is statistically significant at conventional levels in the *Non-performing loans* equation. The positive coefficients in the *Z-score* equations and the negative one in the *Non-performing loans* equation suggest that increases in creditor protection in bankruptcy reduce bank risk after controlling for the increase in bank market competition. This result suggests that higher recovery rates in bankruptcy associated with stronger creditor rates offset the higher default rates when banks ease their lending standards as the consequence of the higher expected recovery rates if there were no changes in bank competition. However, the increase in bank competition encourages bank risk-taking incentives and counteracts the positive effect of stronger creditor rights on bank stability through higher recovery rates.

5. Conclusions

This paper provides new empirical evidence on how the legal protection of creditor rights in bankruptcy affects bank market competition and bank risk. I focus on legal changes in creditor rights instead of on cross-sectional differences to deal with concerns about endogeneity and omitted variables. Applying a DID analysis in a panel data for a maximum of 2,223 banks from 68 countries, I find that an increase (decrease) in creditor rights in the country's bankruptcy law on average increases (reduces) bank market competition. Moreover, there is cross-country heterogeneity depending on other country regulatory characteristics affecting bank competition. In particular, I find that an increase in creditor rights increases bank market competition more in countries with less stringent restrictions on bank entry and non-traditional bank activities.

The results also indicate that the change in bank market competition is a channel through which changes in creditor rights impact on bank stability. An increase (reduction) in bank market competition after an increase (reduction) in creditor rights in bankruptcy increases bank insolvency risk measured by the Z-score and the ratio of non-performing loans. This result is consistent with higher bank competition increasing bank risk-taking incentives and the easing of lending standards. Therefore, the increase in bank competition modifies the trade-off between recovery and default rates because it increases default rates but not recovery rates. The results also show that an increase in creditor rights reduces bank risk after controlling for the increase in bank market competition. This suggests that the increase in recovery rates associated with stronger creditor rights offsets the increase in default rates if the change in creditor rights does not affect bank competition.

In terms of policy implications, the paper suggests additional trade-off effects for the regulation of creditor rights. Regulators not only have to balance the positive effects of strong creditor rights on bank credit supply and economic growth with the negative effects on risky corporate investments, innovation, and the reduction in corporate investment during financial crises, as previous evidence suggests, but also have to consider that strong creditor rights increase bank competition and risk. The results also suggest that regulators should consider interaction effects with other regulatory variables. In particular, strong creditor rights in bankruptcy do not impose costs in terms of increasing bank risk in countries where tighter restrictions on bank entry and non-traditional activities do not promote bank competition. These results imply that additional measures to reinforce bank stability after increases in creditor rights would be less advisable in these countries. However, both traditional regulatory and supervisory actions based, for instance, on capital requirements and more supervisory efforts would be needed in countries with less stringent restrictions on bank entry and non-traditional bank activities. Moreover, the tightening of legal restrictions on bank entry and non-traditional activities would also be a possible regulatory action to counteract the bank risk-taking incentives encouraged by stronger creditor rights.

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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[8] I check the robustness of the results to an alternative set of instruments. First, the results do not change when I drop *Restrict* and only use *Entry* as the instrument. Second, the results do not change when I include the index of financial freedom computed by the Heritage Foundation as the additional instrument. Third, the results remain when I use *Concentration* as the additional instrument to *Entry* and *Restrict*. However, in this case, the Sargan test is not always insignificant, suggesting that *Concentration* in some sub-samples impacts on bank risk even after controlling for its influence on bank competition.

Data availability

Data will be made available on request.

Appendix A

Appendix B. Estimating marginal cost for the Lerner index

We estimate the marginal cost on the basis of the following translogarithmic cost function:

$$\ln C_{it} = \alpha_0 + \ln TA_{it} + \frac{1}{2}\alpha_k(\ln TA_{it})^2 + \sum_{z=1}^{3}\beta_z \ln w_{zit} + \frac{1}{2}\sum_{z=1}^{3}\sum_{k=1}^{3}\beta_{zk}\ln w_{zit}\ln w_{kit}$$

$$+\frac{1}{2}\sum_{z=1}^{3}\gamma_z \ln TA_{it}\ln w_{zit} + \mu_1 Trend + \mu_2\frac{1}{2}Trend^2 + \mu_3 Trend\ln TA_{it}$$

$$+\sum_{z=1}^{3}\lambda_z Trend\ln w_{zit} + \ln u_i$$

where C_{it} is the total financial and operating costs (interest expense + commission expense + fee expense + trading expense + total operating expense) of bank i at time t, TA_{it} total assets and w_z the price of the different factors of production (z). We consider the price of three inputs: labor (w_1), fixed assets (w_2), and borrowed funds (w_3). They are calculated as follows:

w_1 = personnel expense / total assets.
w_2 = (total operating expense - personnel expense) / fixed assets.
w_3 = interest expense / deposits and short-term funding.

We estimate the costs function (and hence marginal costs) separately for each country over the sample period. We allow the parameters of the cost function to vary from one country to another to reflect different technologies. To capture the influence of variables specific to each bank, we estimate the function by introducing fixed individual effects. We capture the influence of technical change on the cost function over time by including Trend.

Table A1
Variable definitions and data sources. This table defines the variables used in the paper and their source.

NAME	DEFINITION	SOURCE
Bank competition		
Lerner	The difference between the interest rate and marginal cost expressed as a percentage of price. It takes the value of 0 in perfect competition and 1 under perfect monopoly. Therefore, it is positively related to bank market power and is inversely related to bank competition. Appendix B indicates how Lerner is estimated in this paper.	BankFocus Bureau van Dijk Database
	Bank risk	
Zscore	This variable provides a measure inversely related to a bank's insolvency probability. Z-score compares the buffer of a bank (capitalization and returns) with the volatility of those returns. It is estimated as (ROA+(equity/assets))/sd(ROA); sd(ROA) is the standard deviation of ROA. I use a five-year moving window, including the two previous years and the two subsequent years, to calculate the standard deviation of ROA. I use the natural logarithm of the Z-score.	BankFocus Bureau van Dijk Database
Non-performing loans	Ratio of non-performing loans to total bank loans.	BankFocus Bureau van Dijk Database
	Creditor rights	
Bankruptcy	Protection of creditor rights in bankruptcy. It takes a value of 1 for each affirmative response to the following four questions: 1) Are secured creditors paid first (i.e. before tax claims and employee claims) when a debtor defaults outside an insolvency procedure? 2) Are secured creditors paid first (i.e. before tax claims and employee claims) when a business is liquidated? 3) Are secured creditors either not subject to an automatic stay or moratorium on enforcement procedures when a debtor enters a court-supervised reorganization procedure, or does the law provide secured creditors with grounds for relief from an automatic stay or moratorium (for example, if the movable property is in danger) or set a time limit for the automatic stay? 4) Does the law allow parties to agree on out-of-court enforcement at the time a security interest is created? Does the law allow the secured creditor to sell the collateral through public auction and private tender, or to keep the asset in satisfaction of the debt? Therefore, *Bankruptcy* ranges from a minimum value of 1 to a maximum value of 4.	Legal rights index. Doing Business. World Bank.
Collateral	Protection of collateral for creditors. It takes a value of 1 for each affirmative response to the following six questions: 1) Can any business use movable assets as collateral while keeping possession of the assets, and can any financial institution accept such assets as collateral? 2)	Legal rights index. Doing Business. World Bank.

Table A1 (*continued*)

NAME	DEFINITION	SOURCE
	Does the law allow businesses to grant a non-possessory security right in a single category of movable assets, without requiring a specific description of collateral? 3) Does the law allow businesses to grant a non-possessory security right in substantially all of their assets, without requiring a specific description of collateral? 4) Can a security right extend to future assets, and can it extend automatically to the products, proceeds or replacements of the original assets? 5) Is a general description of debts and obligations permitted in collateral agreements; can all types of debts and obligations be secured between parties; and can the collateral agreement include a maximum amount for which the assets are encumbered? 6) Is a collateral registry or registration institution for security interests on movable property in operation, unified geographically and by asset type, with an electronic database indexed by debtors' names? Therefore, *Collateral* ranges from a minimum value of 1 to a maximum value of 6.	
Changebankruptcy	It takes the value zero (one) for years before an increase (decrease) in the protection of creditor rights in bankruptcy, and one (zero) for years after an increase (decrease). It always takes the value zero for countries that do not experience any change in creditor protection in bankruptcy.	Legal rights index. Doing Business. World Bank.
Bank-level control variables		
Size	The natural logarithm of total bank assets	BankFocus Bureau van Dijk Database
Liquidity	The ratio of liquid assets to total assets	BankFocus Bureau van Dijk Database
Interest income	Interest income over total bank income	BankFocus Bureau van Dijk Database
Overhead costs	Personnel expenses and other non-interest expenses over total bank assets	BankFocus Bureau van Dijk Database
Regulatory, institutional, and market structure variables		
Entry	Legal restrictions on entry into the banking industry. ENTRY is based on whether or not the following information is required: (1) draft by-laws; (2) intended organizational chart; (3) financial projections for first 3 years; (4) financial information on main potential shareholders; (5) background/experience of future directors; (6) background/experience of future managers; (7) sources of funds to be used to capitalize the new bank; and (8) market differentiation intended for the new bank. Each type of information is assigned a value of 1 if it is required, and 0 otherwise. Thus, *Entry* ranges from a minimum value of 0 to a maximum value of 8, and higher values of this variable indicate stronger barriers on entry into the banking industry.	World Bank's Regulation and Supervision Database
Restrict	A measure of a bank's ability to engage in activities other than banking (including securities, insurance and real estate). A higher score indicates more restrictions on banks for engaging in such activities.	World Bank's Regulation and Supervision Database
Concentration	Assets of the three largest commercial banks as a share of total commercial banking assets. Total assets include total earning assets, cash and due from banks, foreclosed real estate, fixed assets, goodwill, other intangibles, current tax assets, deferred tax assets, discontinued operations and other assets.	Global Financial Development Database (GFDD). World Bank.
KKZ	The Kaufman et al. (2001) KKZ index. This is calculated annually as the average of six indicators: voice and accountability in the political system; political stability; government effectiveness; regulatory quality; rule of law; and control of corruption. Higher values indicate better institutional quality. I use annual values over our analysis period. See Kaufman et al. (2009) for a more detailed explanation.	The Worldwide Governance Indicators (WGI). World Bank
Capital stringency	A capital regulatory index defined as the sum of two measures of capital stringency: Overall Capital Stringency, which indicates whether there are explicit regulatory requirements regarding the amount of capital that a bank must have relative to various guidelines; and Initial Capital Stringency, which indicates whether the source of funds counted as regulatory capital can include assets other than cash or government securities and borrowed funds, as well as whether the sources are verified by the regulatory or supervisory authorities. CAPREG may range in value from 0 to 9, with a higher value indicating greater stringency.	World Bank's Regulation and Supervision Database
Official supervision	Official supervisory power, ranging from 0 to 16, captures the power of supervisors to take prompt corrective action, to restructure and reorganize troubled banks, and to declare a troubled bank insolvent. Higher values indicate greater power of supervisors.	World Bank's Regulation and Supervision Database
Government spending	The ratio of government spending to GDP.	IMF Financial statistics
Country-level control variables		
Bank development	The ratio of private credit of deposit money banks to GDP.	Global Financial Development Database (GFDD). World Bank.
Equity market development	The ratio of stock market capitalization to GDP.	Global Financial Development Database (GFDD). World Bank.
GDPgrowth	Annual growth in GDP.	Global Financial Development Database (GFDD). World Bank.
lnGDPpc	The natural logarithm of GDP per capita.	Global Financial Development Database (GFDD). World Bank.

Table A2
Reforms in bankruptcy laws. This table describes the types of changes in bankruptcy law for each country included in the sample following the criteria of the World Bank's legal rights index.

Country	Year of change in Bankruptcy law	Type of change in Bankruptcy law
(1)	(2)	(3)
Armenia	2007 (+1)	The law allowed parties to agree in a collateral agreement that the lender may enforce its security right out of court
Bangladesh	2008 (-1)	The law reduced the rights of secured creditors to be paid first (i.e. before tax claims and employee claims) when a debtor defaults outside an insolvency procedure
Croatia	2006 (+1)	The law allowed parties to agree in a collateral agreement that the lender may enforce its security right out of court
Czech Republic	2009 (-1)	The law introduced an automatic stay and secured creditors cannot seize their collateral when a debtor enters a court-supervised reorganization procedure.
France	2007 (+1)	The law allowed parties to agree in a collateral agreement that the lender may enforce its security right out of court
Germany	2009 (-1)	The law introduced an automatic stay and secured creditors cannot seize their collateral when a debtor enters a court-supervised reorganization procedure.
Ghana	2008 (+1)	The law eliminated the automatic stay and secured creditors can seize their collateral when a debtor enters a court-supervised reorganization procedure.
India	2007 (+1)	The law allowed parties to agree in a collateral agreement that the lender may enforce its security right out of court
Kyrgyz Republic	2007 (+1)	The law allowed parties to agree in a collateral agreement that the lender may enforce its security right out of court
Peru	2007 (+1)	The law allowed parties to agree in a collateral agreement that the lender may enforce its security right out of court
Romania	2008 (+1)	The law allowed parties to agree in a collateral agreement that the lender may enforce its security right out of court
Serbia	2011 (+1)	The law allowed secured creditors to be paid first (i.e. before tax claims and employee claims) when a debtor defaults outside an insolvency procedure
Slovenia	2009 (-1)	The law introduced an automatic stay and secured creditors cannot seize their collateral when a debtor enters a court-supervised reorganization procedure.
Sri Lanka	2009 (+1)	The law eliminated the automatic stay and secured creditors can seize their collateral when a debtor enters a court-supervised reorganization procedure
Sweden	2010 (+1)	The law allowed secured creditors to be paid first (i.e. before tax claims and employee claims) when a debtor defaults outside an insolvency procedure

Table A3
Propensity-score based matching model. The dependent variable in the logit model (Treat) takes the value of one for countries experiencing a legal change in creditor rights in bankruptcy over the 2005–2013 period, and 0 for non-reforming countries over the 2005–2013 period. Legal origin identifies the legal origin of each country and takes values from 1 to 4 (1 for countries with Scandinavian Civil Law, 2 for countries with German Civil Law, 3 for countries with Socialist Law, 4 for countries with French Civil Law, and 5 for countries with English Common Law. *KKZ* is the indicator of overall country institutional development. *Z-score* is the Z-score of the national banking system, defined as the return on assets plus the capital asset ratio divided by the standard deviation of asset returns. *Bank development* is the ratio of private credit of deposit money banks to GDP. *Equity market development* is the ratio of stock market capitalization divided by the country's GDP. *GDPgrowth* is the real domestic product growth; *LnGDPpc* is the natural logarithm of GDP per capita; *LnPopulation* is the natural logarithm of total country's population. The explanatory variables are measured in 2005. Robust standard errors are in parentheses.

	Dependent variable: Treat
Legal origin	−0.5097**
	(0.2062)
KKZ_{2005}	−0.1190
	(0.5563)
$Z\text{-score}_{2005}$	0.0235
	(0.0226)
Bank development$_{2005}$	0.0010
	(0.0078)
Equity market development$_{2005}$	−0.0157
	(0.0099)
GDPgrowth$_{2005}$	−1.4521
	(1.1565)
LnGDPpc$_{2005}$	0.0253
	(0.2884)
LnPopulation$_{2005}$	0.2568*
	(0.1502)
Pseudo R2	0.1877
# observations	68

References

Acharya, V.V., Amihud, Y., Litov, L., 2011. Creditor rights and corporate risk-taking. J. Financ. Econ. 102, 150–166.

Acharya, V.V., Subramanian, K.V., 2009. Bankruptcy codes and innovation. Rev. Financ. Stud. 22, 4949–4988.

Agoraki, M.-E., Delis, M., Pasiouras, F., 2011. Regulations, competition and bank risk-taking in transition countries. J. Financ. Stab. 7, 38–48.

Barth, J., Caprio, G., Levine, R., 2004. Bank regulation and supervision: what works best? J. Financ. Intermed. 13, 205–248.

Batten, J.A., Choudhury, T., Kinateder, H., Wagner, N.F., 2022. Volatility impacts on the European banking sector: GFC and COVID-19. Ann. Oper. Res. 1–26.

Beck, T., Demirgüç-Kunt, A., Levine, R., 2006. Bank concentration, competition, and crises: first results. J. Bank. Financ. 30, 1581–1603.

Beck, T., De Jonghe, O., Schepens, G., 2013. Bank Competition and Stability: Cross-country heterogeneity. J. Financ. Intermed. 22, 218–244.

Berger, A.N., Klapper, L., Turk-Ariss, R., 2009. Bank Competition and Financial Stability. J. Financ. Serv. Res. 35, 99–118.

Bertrand, M., Mullainathan, S., 2003. Enjoying the quiet life? Corporate governance and managerial preferences. J. Polit. Econ. 111, 1043–1075.

Biswas, A., 2019. Creditor rights and the market power-stability relationship in banking. J. Financ. Stab. 40, 53–63.

Boyd, J., De Nicolò, G., 2005. The theory of bank risk taking and competition revisited. J. Financ. 60, 1329–1343.

Brockman, P., Unlu, E., 2009. Dividend policy, creditor rights, and the agency costs of debt. J. Financ. Econ. 92, 276–299.

Calderon, C., Schaeck, K., 2016. The Effects of Government Interventions in the Financial Sector on Banking Competition and the Evolution of Zombie Banks. J. Financ. Quant. Anal. 51, 1391–1436.

Calomiris, C.W., Haber, S.H., 2014. Fragile by Design: The Political Origins of Banking Crises and Scarce Credit. Princeton University Press.

Cho, S.-S., El Ghoul, S., Guedhami, O., Suh, J., 2014. Creditor rights and capital structure: Evidence from international data. Finance 25, 40–60.

Claessens, S., Laeven, L., 2004. What drives bank competition? Some international evidence. J. Money Credit Bank. 36, 585–592.

Dahejia, R., Wahba, S., 2002. Propensity score matching methods for nonexperimental causal studies. Rev. Econ. Stat. 84, 151–161.

Daly, K., Batten, J.A., Mishra, A.V., Choudhury, T., 2019. Contagion risk in global banking sector. J. Int. Finan. Markets. Inst. Money 63, 101136.

Davis, E.P., Karim, D., Noel, D., 2020. The bank capital-competition-risk nexus-A global perspective. J. Int. Finan. Markets. Inst. Money 65, 101169.

Dell'Ariccia, G., Marquez, R., 2004. Information and bank credit allocation. Journal of Financial Economics 72, 185–214.

Demirgüç-Kunt, A., Detragiache, E., 2002. Does deposit insurance increase banking system stability? An empirical investigation. J. Monet. Econ. 49, 1373–1406.

Demirgüç-Kunt, A., Huizinga, H., 2010. Bank activity and funding strategies: The impact on risk and returns. J. Financ. Econ. 98, 626–650.

Djankov, S., McLiesh, C., Shleifer, A., 2007. Private credit in 129 countries. J. Financ. Econ. 84, 299–329.

Forssbaeck, J., Shehzad, C.T., 2015. The conditional effects of market power on bank risk-cross-country evidence. Eur. Finan. Rev. 19, 1997–2038.

Goetz, M.R., 2018. Competition and bank stability. J. Financ. Intermed. 35, 57–69.

González, F., 2016. Creditor rights, bank competition, and corporate investment during the global financial crisis. Finance 37, 249–270.

Gu, X., Kowalewski, O., 2016. Creditor rights and the corporate bond market. J. Int. Money Financ. 67, 215–238.

Haselmann, R., Pistor, K., Vig, V., 2010. How law affects lending. Rev. Financ. Stud. 23, 549–580.

Houston, J.F., Chen, L., Ping, L., Yue, M., 2010. Creditor rights, information sharing, and bank risk taking. J. Financ. Econ. 96, 485–512.

Jayaraman, S., Thakor, A., 2014. Who monitors the monitor? Bank capital structure and borrower monitoring. Working paper.

Jimenez, G., López, J.A., Saurina, J., 2013. How does competition affect bank risk taking? J. Financ. Stab. 9, 185–195.

Kalyvas, A.N., Mamatzakis, E., 2017. Do creditor rights and information sharing affect the performance of foreign banks? J. Int. Finan. Markets. Inst. Money 50, 13–35.

Kaufman, D., Kraay, A., Mastruzzi, M., 2009. Governance Matters VIII: Aggregate and Individual Governance Indicators 1996-2008, World Bank Policy Research Working Paper No. 4978.

Keeley, M.C., 1990. Deposit insurance, risk, and market power. Am. Econ. Rev. 80, 1183–1200.

Kinateder, H., Choudhury, T., Zaman, R., Scagnelli, S.D., Sohel, N., 2021. Does boardroom gender diversity decrease credit risk in the financial sector? Worldwide evidence. J. Int. Finan. Markets. Inst. Money 73, 101347.

Kroszner, R., Laeven, L., Klingebiel, D., 2007. Banking crises, financial dependence, and growth. J. Financ. Econ. 84, 187–228.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., 2008. The economic consequences of legal origins. J. Econ. Lit. 46, 285–332.

Laeven, L., Levine, R., 2009. Bank governance, regulation and risk taking. J. Financ. Econ. 93, 259–275.

Laeven, L., Valencia, F., 2018. Systemic Banking Crises Revisited. IMF working paper no 18/206.

Li, J., Maung, M., Wilson, C., 2018. Governance and financial development: A cross-country analysis. J. Int. Finan. Markets. Inst. Money 52, 227–239.

Maudos, J., Fernández De Guevara, J., 2004. Factors explaining the interest margin in the banking sectors of the European Union. J. Bank. Financ. 28, 2259–2281.

Petersen, M.A., 2009. Estimating standard errors in finance panel data sets: comparing approaches. Rev. Financ. Stud. 22, 435–480.

Petersen, M.A., Rajan, R.G., 1994. The benefits of lending relationships: Evidence from small business data. J. Financ. 49, 1367–1400.

Petersen, M.A., Rajan, R.G., 1995. The effect of credit market competition on lending relationships. Q. J. Econ. 110, 407–443.

Schaeck, K., Cihak, M., Wolfe, S., 2009. Are competitive banking systems more stable? J. Money Credit Bank. 41, 711–734.

Turk-Ariss, R., 2010. On the implications of market power in banking: Evidence from developing countries. J. Bank. Financ. 34, 765–775.

Vig, V., 2013. Access to collateral and corporate debt structure: Evidence from a natural experiment. J. Financ. 68, 881–928.

Yung, K., Nafar, N.A., 2014. Creditor rights and corporate cash holdings: International evidence. Int. Rev. Econ. Financ. 33, 111–127.