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Creditor rights and the market power-stability relationship in banking

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ABSTRACT

I use the staggered passage of creditor rights reforms in 13 countries to examine how changes in creditor rights affect (a) bank stability and (b) the bank market power-stability relationship. (a) There is statistically weak evidence that stronger creditor rights enhance bank stability; the result is not robust across specifications. (b) Market power positively affects stability. However, there is asymmetry in the effect of market power on stability, depending on whether there is an increase or a decrease in creditor rights. The market power-stability relationship is stronger when a country weakens its creditor rights vis-á-vis when it strengthens its creditor rights.

1. Introduction

I analyse the market power-stability relationship in the context of the legal setting in which the bank operates. I examine whether the effect of market power on bank risk-taking differs, depending on an increase versus a decrease in creditor rights. I find that the effect of market power on bank stability is significantly smaller when there is an increase in creditor rights, compared to the situation when there is a decrease in creditor rights. The policy implications are potentially large: in countries with poor creditor rights (such as the French civil law countries), policies reducing competition could be a fruitful channel for fostering stability in the banking sector. However, similar policies will be less effective in countries with stronger creditor rights (such as the English common law countries).

In this paper, I explore how bank-level stability is affected by changes in creditor rights and the interaction of creditor rights and bank market power. I provide evidence using the staggered passage of legal reforms in 13 countries between 1995 and 2004 (treatment countries). The reforms include both increases and decreases in creditor rights. I proxy bank stability with the *Z-score*, which measures the bank's distance to default. The proxy for bank market power is the *Lerner* index, which is measured at the bank-year level. I show that the interaction effect of bank market power and creditor rights on bank stability is negative, statistically robust and economically large.

Conceptually, one may make a strong case to study the interaction effects of market power and creditor rights on bank stability. Both higher bank market power and creditor rights lead to higher bank profitability. I conjecture that higher market power or creditor rights have a bigger positive impact on a bank's profitability, which is closer to bankruptcy than one that is already very profitable and far from bankruptcy. Finally, since bank stability is increasing in profitability (directly from the definition of *Z-score*), we expect that at lower levels of bank market power, the effect of an increase in creditor rights on bank profitability (and therefore, stability) is bigger than at higher levels of bank market power. I call this effect the substitution effect.

There are two main findings:

First, I examine the effect of a change in creditor rights on bank stability. The effect could go either way. Stronger creditor rights lead to higher recovery rates in the event of borrower defaults and reduces risk. At the same time, banks anticipate higher recovery rates and ease their lending standards, leading to higher risk-taking. Empirically, on the one hand, I find that the stand-alone effect of stronger creditor rights is an increase in bank stability. Potentially, banks become more stable due to an increase in recovery rates as a consequence of higher creditor rights. However, on the other hand, an increase in creditor rights also weakens the positive effect of bank market power on stability. Overall, I find statistically weak

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evidence that an increase (decrease) in creditor rights leads to an increase (decrease) in bank stability.

Second, I test the substitution hypothesis, outlined above. I find strong evidence in support of this hypothesis and the results survive a host of robustness checks. Economically, the magnitude of the effect is large: a one-standard deviation increase in market power (*Lerner* index) is associated with a 6.9% increase in bank stability (*Z-score*) when there is an increase in creditor rights. However, when there is a decrease in creditor rights, a one-standard deviation increase in market power is associated with a 23% increase in the *Z-score*. Consistent with my hypothesis, I find that this result is mostly driven by bank profitability (*ROA*).

Next, I introduce non-linearity into the model by augmenting the baseline with the quadratic term for the *Lerner* index and its interactions with the changes in creditor rights. I find evidence that bank stability is non-linear in market power. Further, the results indicate that the substitution effect is even stronger at higher levels of market power.

One may be concerned regarding the potential endogeneity of the legal reforms passage itself. If the passage of the legal reforms are correlated with some country-specific variables, it will bias inferences. I take several steps to address this issue. First, I consider a subset of the control countries, which are ex-ante, as likely as the treatment countries to have passed legal reforms, based on observable macroeconomic variables. This subset forms a matched control group to use as a benchmark against the treatment countries. Second, I use country-year fixed effects (a dummy for each country-year pair) in order to account for all differences (both observable and unobservable) between the treatment and control countries. Finally, the parallel trends test shows that the pre-treatment (before the passage of the legal reforms) differences between the banks in the treatment and control countries are purely random.

2. Related literature

The paper is related to two principal strands of the literature: the market power-stability literature and the law and finance literature.

There is a vast literature on the relationship between market power and bank stability. The market power-stability view argues that market power increases banks' charter values and consequently, induces lower risk-taking (Keeley, 1990; Hellmann et al., 2000; Allen and Gale, 2000; Matutes and Vives, 2000; Repullo, 2004). On the other hand, the market power-fragility view posits that higher market power leads to higher interest rates on loans, which induces borrowers to take excessive risk (Boyd and Nicolo, 2012). The empirical findings have been mixed (Claessens, 2009). Macro evidence using market-level measures of competition finds support for the market power-fragility view (e.g., Beck et al., 2006; Schaeck et al., 2009; Goetz, 2017). However, recent studies using cross-country data and micro-level proxies for bank market power (e.g., the *Lerner* index) provide support for the market power-stability view (see Forssbaeck and Shehzad, 2015; Beck et al., 2013).

There are several theoretical (e.g., Martinez-Miera and Repullo, 2010; Gomez and Ponce, 2014) and empirical (e.g. Berger et al., 2009; Jiménez et al., 2013) studies that look at non-linearity in the effect of market power on bank stability. Beck et al. (2013) show that a decrease in market power will have a larger impact on a bank's fragility in countries with stricter activity restrictions, more homogeneous market structures, more generous deposit insurance and more depth in credit information sharing. Forssbaeck and Shehzad (2015) and Behr et al. (2010) consider the effect of regulation and supervision on the market power-risk relationship. They find that better regulation and supervision mitigate the risk-reducing effect of higher market power. Similarly, Agoraki et al. (2011) find that an increase in capital requirements reduces risk in general, but less so in banks with greater market power.

This paper contributes to the literature by showing that stronger creditor rights mitigate the risk-reducing effect of higher market power. There are two key differences between my findings and extant literature: first, I explicitly consider creditor rights as a channel via which market power works, which has not been previously considered. Second, I use exogenous changes in creditor rights, which allows me to consider specifically the effect of the change on the market power-risk relationship, while the literature simply considers the interaction effects without indicating the direction of causality.

Parallelly, the literature on law and finance, owing to La Porta et al. (1997, 1998), generally concludes that stronger investor rights promote capital market development. Esty and Megginson (2003) find that syndicates are more concentrated in countries in which creditor protection is low. Bae and Goyal (2009) analyse the effect of creditor rights on loan pricing. Studies on the specific effect of stronger creditor rights on risk-taking, however, have produced contrasting results. Acharya et al. (2011) find that stronger creditor rights lead to reduced corporate risk-taking. On the other hand, Houston et al. (2010) find that stronger creditor rights encourage more risk-taking in banks.

My work builds on Acharya et al. (2011) and Houston et al. (2010). I find mixed evidence that an increase (decrease) in creditor rights reduces (increases) bank risk-taking (not robust and not always statistically significant). My results are at odds with Houston et al. (2010), who find that an increase in creditor rights is associated with lower bank stability. In contrast to the cross-sectional regressions in Houston et al. (2010), I use legal reforms to study the effect of a change in creditor rights on bank stability. Acharya et al. (2011) use a similar set-up as here (I follow their set-up) to study corporations and find similar results as here. Some other papers have looked at the effect of legal reforms in finance. Sorge et al. (2017) find that legal reforms affect the debt maturity structure in corporate firms. Haselmann et al. (2010) find that an increase in creditor rights leads to an increase in the volume of lending.

In contrast to the above, I consider how creditor rights reforms affect the market power-stability relationship in banking. This interaction effect has so far been unexplored in the extant literature.

3. Hypothesis development

3.1. Creditor rights and bank stability

How does a change in creditor rights affect bank risk-taking? The effect could go either way. Stronger creditor rights lead to higher recovery rates in the event of borrower defaults and reduces bank risk. At the same time, banks anticipate higher recovery rates and ease their lending standards, leading to higher risk-taking.

Which of the two effects dominates remains an empirical issue. The difference-in-differences set-up in this paper allows a clear identification of how a change in creditor rights affects bank risk-taking.

H1a:. Suppose that the effect of a higher recovery rate dominates the bank's anticipatory effects of reducing lending standards when there is an increase in creditor rights. An increase (decrease) in creditor rights reduces (increases) bank risk-taking.

H1b:. Suppose that the bank's anticipatory effects of reducing lending standards dominate the effect of a higher recovery rate when there is an increase in creditor rights. An increase (decrease) in creditor rights leads to an increase (decrease) in bank risk-taking.

3.2. Substitution effect

In the substitution effect, I consider how changes in creditor rights affect the market power-stability relationship. In order to derive this relationship, first note that both higher bank market power and higher creditor rights increase bank profitability (or *ROA*).

The positive effect of bank market power (using bank-level proxies such as the *Lerner* index) on bank profits is widely empirically documented (see Beck et al., 2013; Forssbaeck and Shehzad, 2015; Demsetz et al., 1996). An increase in creditor rights has two positive effects on bank profitability. There is a direct effect, which is an increase in the recovery rate in the event that a borrower defaults. There is an indirect effect whereby the borrower default rate is reduced, e.g., Acharya et al. (2011) find that an increase in creditor rights leads to a lower corporate risk of default. Therefore, an increase in creditor rights has some positive effects on bank profitability.

Both market power and creditor rights positively affect bank profitability. I conjecture that this relationship is concave. This implies that higher market power or creditor rights have a bigger positive impact on a bank's profitability, which is closer to bankruptcy than one which is already very profitable and far from bankruptcy.

Clearly, bank stability is increasing in profitability (*Z-score* is increasing in *ROA*). Hence, at lower levels of bank market power, when banks are less stable, the effect of an increase in creditor rights on bank profitability (and therefore, stability) is bigger than at the higher levels of bank market power, when banks are more stable, e.g., a bank with low market power is less profitable, and therefore benefits more from an increase in recovery rates (due to higher creditor rights) than a bank with high market power and is very profitable to start with. Hence, we expect the interaction effect of bank market power and creditor rights on bank stability to be negative. I state the null hypothesis formally as follows:

H2:. The interaction effect between bank market power and creditor rights on bank stability is negative. The two are substitutes.

4. Data

4.1. Sample

The data are compiled from several sources: Bank-level data are obtained from the BankScope database provided by Bureau van Dijk. Djankov et al. (2007) provide data on legal reforms. Macroeconomic variables are from the World Development Indicators (WDI) database of the World Bank.

I closely follow the sample construction in Jayaraman and Thakor (2014). The main analysis uses the legal reforms to conduct a difference-in-differences analysis. The treatment group comprises 13 legal reform events, in which a country has either strengthened (7 occasions) or weakened (6 occasions) its creditor rights. Djankov et al. (2007) list 32 instances of legal reforms over the period 1978–2004. I exclude reforms prior to 1995 (9 occasions) in order to allow sufficient observations prior to the reform event. There are 5 instances in which bank-level data are not available in BankScope, and hence are excluded. Four countries (Japan, Kazakhstan, Lithuania and Russia) have multiple reforms over the sample period. In these instances, only the most recent reform is used and observations prior to the previous reforms are dropped.

In order to prevent duplicates, I keep information at the unconsolidated level and drop all observations with the consolidation code, C2, in BankScope. The reason I do this is due to the fact that the legal environment is country specific, while consolidated accounting data are often multinational.

I form two sets of control groups – the overall sample of non-reforming countries and the matched sample of non-reforming countries that are similar to the reforming countries. The sample of countries is from Jayaraman and Thakor (2014) (the overall control group is missing some countries from their list due to data restrictions; the matched control group is identical to their matched control group).

A presents the list of reform events. Additionally, it includes the list of countries that comprises the two control groups. Each reform I consider is a change in the index by 1. Djankov et al. (2007) report that Finland and Niger shift their creditor rights index by 2, but neither country is included in my sample. The increases are from a low value of the index (1 or 2) and the decreases are from a high value of the index (3 or 4, apart from Sweden, which goes from 2 to 1).

4.2. Variables

4.2.1. Risk-taking

The dependent variable is bank risk-taking or its distance from insolvency. As with numerous other studies (e.g., Laeven and Levine, 2009; Houston et al., 2010; Beck et al., 2013), I proxy bank insolvency risk with the *Z-score*. It equals the return on assets plus the equity-to-assets ratio, divided by the standard deviation of the return on assets:

$$Z_{i,t} = \frac{ROA_{i,t} + (E/A)_{i,t}}{\sigma_i(ROA)} \quad (1)$$

ROA is the return on assets, *E/A* denotes the equity-to-assets ratio and $\sigma(ROA)$ is the standard deviation of *ROA* over the full sample period in the study (following Forssbaeck and Shehzad, 2015). For robustness, I also compute $\sigma(ROA)$ using a rolling time window (following Schaeck and Cihak, 2012; Beck et al., 2013).

The measure, *Z-score*, may be interpreted as the number of standard deviations that a bank's profits have to fall for the bank to just deplete its equity capital and become insolvent (Roy, 1952). A higher *Z-score* signals that a bank has a lower insolvency risk. It is well known that the distribution of *Z-score* is highly skewed; hence, I use the natural logarithm of *Z-score* in the regression analysis.

4.2.2. Market power

Following several recent studies in the competition-stability literature (Beck et al., 2013; Forssbaeck and Shehzad, 2015), I use the *Lerner* index as a proxy for bank market power. The *Lerner* index captures a bank's profits over and above its marginal cost. It is defined as:

$$L_{i,t} = \frac{P_{i,t} - MC_{i,t}}{P_{i,t}} \quad (2)$$

P is the price of the bank output (ratio of total income to total assets) and *Mc* is the marginal cost of the production of this output. The marginal cost is estimated on the basis of a translog cost function with one output (total assets) and three input prices (personnel expenses, operating costs, and interest expenses). It is estimated following Beck et al. (2013) and others. The marginal cost for each bank is obtained by differentiating the cost with the bank output (total assets). A higher value of the *Lerner* index indicates that the bank extracts more rents and has higher market power.

As Delis et al. (2016, 2017) and Beck et al. (2013) point out, there are several advantages of using the *Lerner* index as a proxy for market power. First, the main reason for using the *Lerner* index is a pragmatic one, as it is easily measurable at the bank-year level. Second, it does not rely on assumptions of bank homogeneity, unlike market concentration measures. As a robustness check, I replace the *Lerner* index with the net interest margin as a measure of bank market power. A wider margin indicates stronger market power.

4.2.3. Controls

I include the usual bank-level controls used in the literature: the log of bank assets, annual growth in assets, the level of deposits and overheads. All bank-level controls have been winsorised at the 1% level to minimise the effect of outliers.

Turning to the country-level controls, I include the log of *GDP per capita* and the growth rate in *GDP*. I control for the annual *Inflation* rate. I include a proxy for financial market development in the form of capitalization in the stock market as a percentage of *GDP, mcap*. Finally, I include the sum of exports and imports, *Trade* (in logs).

4.3. Summary statistics

Panel A of Table 1 presents the bank-level summary statistics of the entire sample. The average bank funds itself with 9% equity and 80% deposits. The average profitability (return on assets) is 7.4%. The main bank-level variables are the *Z-score* (insolvency risk) and the *Lerner* index (market power). The average bank has a *Z-score* of 2.05 and ranges from 0 (almost bankrupt) to 225.8. Similarly, there is sufficient variability in the *Lerner* index with a mean of.21 and ranging from −8.5 to 1. The *Lerner* index can be negative in the short run, but a negative *Lerner* index may not be sustained in the long run; meanwhile if the index takes a value 1, it indicates a monopoly.

In Panel B, I report the variation of the key variables (*Z-score* and *Lerner* index) at different levels. Similar to Beck et al. (2013) most of the variation in both the *Z-score* and *Lerner* index arises between banks rather than within banks over time. Also, similar to their observation, there is larger variation across banks within a specific country in a given year, as opposed to across countries.

In terms of the country-level variables (Table 2), the GDP growth rate is 3.6% and the annual inflation rate is 7%. It can be seen from the range of GDP per capita that the sample consists of both rich and poor countries, allowing for heterogeneity in the cross-section.

In Table 3, I report the main variables of interest by legal origin. La Porta et al. (1997, 1998) and Djankov et al. (2007) find that the common law countries afford stronger protection to external investors (both creditors and shareholders), compared to civil law countries. I verify this result in my dataset. The English common law countries have the strongest creditor rights (2.64) and the French civil law countries have the weakest (1.54), with the other civil law countries lying in the middle. Does that give rise to systematic patterns in the variables of interest considered in this paper?

The average *Z-score* is highest in the common law countries, which suggests that bank stability is higher when there are stronger creditor rights. The average *Z-score* is lowest in the German civil law countries and Socialist countries. The countries belonging to the French civil law family come second in rank of the average *Z-score*, despite their reputation of having the lowest creditor rights. There is less variation in the average *Lerner* index, which ranges from 0.18 to 0.24. Bank stability and market power are positively correlated in each of the legal families, which provides suggestive evidence for the market power-stability relationship. The substitution hypothesis predicts that the relationship should be stronger in countries with lower creditor rights (the civil law countries). Indeed, the average correlation is.15 in the common law countries while, almost double at around.3 in the civil law countries. The French and German civil law countries have similar averages, while the 3 Scandinavian countries in the sample have much bigger average correlations.

5. Empirical methodology

The empirical strategy relies on legal reforms where countries either strengthened or weakened their creditor rights. The research setting is borrowed from Djankov et al. (2007), Acharya et al. (2011) and Jayaraman and Thakor (2014).

I use a difference-in-differences (DiD) set-up. The dependent variable is bank risk-taking as proxied by the *Z-score*. *Post* is an indicator variable that takes a value, 1, for the years after the passage of the legal reform in the reforming countries. *Inc* and *Dec* are two indicator variables that take a value of 1 for countries passing legal reforms that either strengthened or weakened their creditor rights, respectively. All three indicator variables take a value of 0 in non-reforming countries. The *DiD* effect is captured by the interaction terms *Inc*Post* and *Dec*Post*.

Does a change in creditor rights affect the relationship between market power and bank stability? The interaction terms, *Inc*Post*Lerner* and *Dec*Post*Lerner*, examine how the effect of market power changes if there is an increase or decrease in creditor rights, respectively.

The empirical specification is set out as follows:

$$\begin{aligned} Z_{i,t} = \; & \gamma_j + \gamma_t + \beta_1 Inc * Post + \beta_2 Dec * Post + \beta_3 Lerner_{i,t-1} \\ & + \beta_5 Inc * Post * Lerner_{i,t-1} + \beta_6 Dec * Post * Lerner_{i,t-1} + \alpha X_{i,t-1} + \delta C_{j,t} + \epsilon \end{aligned} \quad (3)$$

The indices *i*, *j*, *t* stand respectively for bank, country and time (year). The vector of the bank-specific variables, X_{ijt}, characterise the bank's business model. It contains information from the bank's financial statements. The vector, C_{jt}, contains country-specific control variables. All bank-level control variables are lagged by one year in order to address any endogeneity concerns.

In the core specification, country (γ_j) and year (γ_t) fixed effects are included. The country fixed effects absorb all time-invariant variation across countries, including whether countries passed legal reforms. Therefore, these fixed effects subsume the coefficients on *Inc* and *Dec*. Similarly, the year fixed effects absorb the coefficient on *Post*. The error term in the regression may be serially correlated, as the dependant variable is at the bank-country-year level, and some of the explanatory variables are observed at the country-year level (Moulton, 1990). Therefore, errors are clustered at the country-level (same as Acharya et al., 2011; Jayaraman and Thakor, 2014).

If bank market power positively affects bank stability, we expect a positive coefficient on the *Lerner* index, $\beta_3 > 0$. If, on the other hand, market power is detrimental for stability, we will find that $\beta_3 < 0$.

The hypothesis, *H1*, considers the effect of a change in creditor rights on the level of bank risk-taking. The stand-alone effect of an increase in creditor rights is given by the coefficient on *Inc*Post*, β_1 and the stand-alone effect of a decrease in creditor rights is given by the coefficient on *Dec*Post*, β_2. However, the overall effect of a change in creditor rights will include its interaction effect with market power (β_5 for an increase and β_6 for a decrease in creditor rights). Therefore, the overall effect of an increase in creditor rights is the sum of the stand-alone effect of an increase in creditor rights and the interaction effect via market power ($\beta_1 + \beta_5 * Lerner|_{Inc*Post=1}$). Similarly, the overall effect of a decrease in creditor rights is captured by ($\beta_2 + \beta_6 * Lerner|_{Dec*Post=1}$). The difference between the two overall effects, denoted Δ^{cr}, reflects the change in bank stability due to an increase in creditor rights, compared to the case when there is a decrease in creditor rights:

$$\Delta^{cr} = \beta_1 - \beta_2 + (\beta_5 * Lerner|_{Inc*Post=1}) - (\beta_6 * Lerner|_{Dec*Post=1}) \quad (4)$$

The hypothesis, *H2*, considers whether the effect of market power on bank risk-taking depends on creditor rights. When there are no legal reforms, the overall effect of market power on risk-taking is fully captured by the coefficient on the *Lerner* index, β_3. However, when there is a change in creditor rights, the overall effect is the sum of the stand-alone effect and the interaction via creditor rights. Does market power affect risk-taking differently if the creditor rights index increases versus if it decreases ($\beta_5 - \beta_6 \neq 0$)? If

Table 1
Summary statistics: bank level.

	Mean	Sd	Min	Max
Panel A				
Lerner	0.21	0.15	−8.54	1.00
Nim	3.39	2.17	−0.16	19.52
Z-score(ln)	0.72	1.08	−7.16	5.42
ROA	0.74	1.03	−7.36	7.73
σ(ROA)	0.50	0.60	0.00	6.10
Equity	0.09	0.07	0.00	0.96
Deposits	0.80	0.14	0.00	1.13
Asset(ln)	6.94	2.01	2.30	13.27
Asset growth	11.70	20.82	−40.43	163.58
Overhead	0.03	0.02	0.00	1.13
			Variation	
Panel B				
Z-score	Between bank		1.055	
	Within bank		0.446	
	Within country-year		0.951	
	Between country		0.486	
Lerner	between bank		0.139	
	Within bank		0.089	
	Within country-year		0.124	
	Between country		0.083	
Observations	57,974			

Table 2
Summary statistics: country level.

	Mean	Sd	Min	Max
GDP growth	3.59	1.50	0.56	8.66
GDP per cap (ln)	8.81	1.37	6.33	10.90
Inflation	6.96	5.05	−0.13	21.58
Trade(ln)	4.25	0.45	3.24	5.55
Mcap/GDP	45.69	49.09	0.72	302.34
Observations	69			

Table 3
Summary by legal origin. This table contains the key variables of interest averaged (equally weighted by countries) at the level of legal origin. *Countries* denotes the number of countries in the sample that belongs to the corresponding legal family. Out of the 74 countries in this table, some drop out of the regressions due to the lack of data. *cr* is the average value of the creditor rights index of LLSV (1998). In countries with legal reforms, I take the time-weighted average. *Z-Score* and the *Lerner* index are the average bank stability and market power, respectively. Corr(Z,Lerner) is the correlation coefficient between the two.

Legal origin	Countries	cr	*Z*-score	Lerner	Corr(Z, Lerner)
English	20	2.64	0.550	0.197	0.153
French	34	1.54	0.443	0.176	0.288
German	14	2.24	0.288	0.193	0.305
Scandanivian	3	2.08	0.346	0.234	0.688
Socialist	3	2.11	0.285	0.243	0.546

there is a substitution effect between market power and creditor rights, we expect that $\beta_5 < 0$ and $\beta_6 > 0$. The substitution hypothesis predicts that the difference should be negative ($\beta_5 - \beta_6 < 0$).

The identification strategy relies on the assumption that the passage of the legal reforms is exogenous and not correlated with country-specific factors. I use the propensity score matched sample from Jayaraman and Thakor (2014) to control for observable differences between the treatment and control countries. Further, in order to control for unobservable differences, I include time-varying country fixed effects (a dummy for each country-year pair). The country-year fixed effects absorb all country-level variations, including the coefficients on *Inc*Post* and *Dec*Post*. Including the country-year fixed effects implies that we exploit only the within country-year variation and control for all time-varying country-specific variables correlated with the passage of legal reforms. This rules out the possibility that the results are driven by some omitted country-specific variables (observed or unobserved).

6. Results

6.1. Baseline

Columns (1)–(4) in Table 4 present the estimation results of the difference-in-differences set-up described in Eq. (3).

In each specification, there is a positive and significant relationship between market power and bank stability (β_3 is positive). This is consistent with a host of theoretical models (see e.g., Keeley, 1990; Matutes and Vives, 2000; Allen and Gale, 2000; Hellmann et al., 2000; Repullo, 2004). It is also consistent with the existing empirical literature, which use *Lerner* index as a proxy for market power (see e.g., Forssbaeck and Shehzad, 2015; Beck et al., 2013). The effect of market power is both statistically significant and economically large. When there are no legal reforms, a one-standard deviation increase in the *Lerner* index, which equals.15, is associated with an average increase in the *Z-score* by 15.3% (1.021*0.15).

Table 4
Baseline. This table contains the baseline results. The dependent variable is the logarithm of *Z*-score. Columns (1)–(4) represent the baseline model. In Columns (5) and (6), the baseline model is augmented by the squared Lerner index and its interactions with the DiD effects. All regressions include both bank and country level controls. All bank-level explanatory variables have been lagged by a year for endogeneity concerns. Δ^{cr} captures the overall effect of an increase in creditor rights on the dependent variable, relative to a decrease in creditor rights. $\beta_5 - \beta_6$ reflects the substitution effect. All regressions include year and country (or country*year) fixed effects and robust standard errors are clustered by country (or country*year). *t-Statistics* are presented in brackets.

	(1) *Z*-score	(2) *Z*-score	(3) *Z*-score	(4) *Z*-score	(5) *Z*-score	(6) *Z*-score
Lerner	1.021***	1.034***	1.359***	1.346***	1.323***	1.741***
	(3.85)	(7.22)	(4.92)	(9.39)	(4.41)	(6.35)
Lerner^2					0.157***	0.260***
					(3.29)	(3.82)
Inc*Post	0.175*		0.248***		0.168	0.272***
	(1.78)		(2.80)		(1.48)	(2.87)
Dec*Post	−0.131		−0.207*		−0.162	−0.224**
	(−1.02)		(−1.81)		(−1.21)	(−2.00)
Inc*Post*Lerner	−0.558**	−0.589***	−0.882***	−0.883***	−0.499	−0.892***
	(−2.33)	(−3.51)	(−3.32)	(−5.21)	(−1.55)	(−3.02)
Dec*Post*Lerner	0.517**	0.571**	0.240	0.308	0.144	−0.210
	(2.13)	(2.58)	(0.93)	(1.37)	(0.54)	(−0.88)
Inc*Post*Lerner^2					−0.0538	−0.154**
					(−1.05)	(−2.23)
Dec*Post*Lerner$\hat{2}$					0.801***	0.739***
					(5.26)	(5.27)
Δ^{cr}	0.075		0.204*		0.186	0.333***
	(0.61)		(1.74)		(1.36)	(2.58)
$\beta_5 - \beta_6$	−1.075***	−1.160***	−1.121***	−1.191***	−0.643***	−0.681***
	(−8.52)	(−5.88)	(−9.86)	(−5.97)	(−4.52)	(−5.27)
Control group	Matched	Matched	Full sample	Full sample	Matched	Full sample
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects	Country, Year	Country*Year	Country, Year	Country*Year	Country, Year	Country, Year
Clustering	Country	Country*Year	Country	Country*Year	Country	Country
Observations	35,077	35,077	53,731	53,731	35,077	53,731
Adjusted R^2	0.039	0.030	0.051	0.038	0.044	0.059

t statistics in parentheses.
* $p < 0.10$. ** $p < 0.05$. *** $p < 0.01$.

The interaction effects between a change in creditor rights and market power, β_5 and β_6, are consistent with the substitution hypothesis. An increase in creditor rights reduces the effect of the*Lerner* index on the *Z-score*, $\beta_5 < 0$. Similarly, a decrease in creditor rights leads to an increase in the effect of the *Lerner* index on the *Z-score*, $\beta_6 > 0$. The coefficients have a consistent sign in every specification. Both coefficients are statistically significant when the matched control group is used, but only β_5 is statistically significant when the entire control group is used as the benchmark.

H2 states that there would be heterogeneity in the effect of market power on bank risk-taking, based on whether a country strengthened or weakened its creditor rights ($\beta_5 - \beta_6 \neq 0$). As predicted by the substitution hypothesis, across all specifications the difference is negative and statistically significant ($\beta_5 - \beta_6 = -1.08$ and *t*-statistic = −8.52). This result is economically very large. A one-standard deviation increase in *Lerner* index is associated with an increase in the *Z-score* by 6.9% if there is an increase in creditor rights. On the other hand, if there is a decrease in creditor rights, a one-standard deviation increase in the *Lerner* index is associated with an increase in the *Z-score* by 23%.

In testing *H1*, note that the effect of a change in creditor rights is a combination of the stand-alone and interaction effects. The stand-alone effect of an increase (decrease) in creditor rights is positive (negative), but is only sometimes statistically significant. However, as noted above, an increase (decrease) in creditor rights reduces (increases) the positive effect of market power on bank stability. I find mixed evidence that bank stability increases when there is an increase in creditor rights, compared to the case when there is a decrease in creditor rights. Specifically, Δ^{cr} (see Eq. (4)) is generally positive in the baseline specifications, but not always statistically significant.

The evidence regarding the stand-alone effect of a change in creditor rights on bank stability is mixed, but points toward hypothesis, *H1a*, which states that an increase (decrease) in creditor rights reduces (increases) bank risk. This indicates that the effect of a higher recovery rate due to an increase in creditor rights dominates the effect of banks lowering lending standards in anticipation of higher recovery rates. However, an increase in creditor rights also leads to a smaller positive effect of bank market power on stability. On balance, the effect of creditor rights on stability is closer to neutral.

Next, in Specifications (5) and (6), I augment the original model with the quadratic term for the *Lerner* index and its interactions with *Inc*Post* and *Dec*Post*. The baseline results remain consistent with the substitution hypothesis. Market power has a smaller effect on bank stability when there is an increase vis-á-vis a decrease in creditor rights.

The coefficient on the quadratic term is positive and statistically significant, indicating that market power non-linearly affects bank risk. The interaction term of the squared *Lerner* index and *Inc*Post* (*Dec*Post*) is negative (positive). This indicates that the substitution effect is even stronger at higher levels of market power. According to the substitution effect, when there is an increase in creditor rights, the effect of market power on stability is weaker. This relationship is further weaker at higher levels of bank market power.

6.2. Robustness: sub-samples

In this section, I consider a sub-sample analysis to test the robustness of the key results. I report the results in Table 5. For each regression, I report the coefficients on the key variables of

Table 5
Robustness: sub-sample analysis. The dependent variable is the logarithm of *Z*-score. I systematically remove treatment countries, one by one. Next, I remove all reforms in any single component of the creditor rights index, one by one. cr1 is no automatic stay on assets, cr2 refers to whether secured creditor paid first, cr3 is whether there are restrictions on going into reorganization, and finally, cr4 refers to whether management stays in the reorganization. All regressions include both bank- and country-level controls. All bank-level explanatory variables have been lagged by a year for endogeneity concerns. Δ^{cr} captures the overall effect of an increase in creditor rights on the dependent variable, relative to a decrease in creditor rights. $\beta_5 - \beta_6$ reflects the substitution effect. All regressions include year and country fixed effects and robust standard errors are clustered by country. *t-statistics* are presented in brackets.

	(1) (Δ^{cr})	(2) ($\beta_5 - \beta_6$)
No Bulgaria	0.074	−1.091***
	(0.60)	(−8.85)
No Indonesia	0.092	−1.121***
	(0.33)	(−5.44)
No Israel	0.108	−1.060***
	(0.89)	(−8.41)
No Japan	0.098	−0.890***
	(0.72)	(−4.00)
No Kazakhstan	0.067	−1.073***
	(0.52)	(−8.49)
No Lithuania	0.075	−1.075***
	(0.61)	(−8.52)
No Romania	0.064	−1.076***
	(0.53)	(−8.68)
No Russia	0.097	−1.087***
	(0.59)	(−6.32)
No Spain	−.029	−1.081***
	(−0.22)	(−8.53)
No Sweden	0.114	−1.167***
	(0.95)	(−9.52)
No Thailand	0.012	−1.022***
	(0.09)	(−7.85)
No Ukraine	0.063	−1.037***
	(0.50)	(−8.74)
No Uruguay	0.079	−1.065***
	(0.64)	(−8.25)
No cr1 reforms	0.099	−1.072***
	(0.79)	(−8.68)
No cr2 reforms	0.088	−0.924***
	(0.36)	(−3.07)
No cr3 reforms	−0.029	−1.081***
	(−0.22)	(−8.52)
No cr4 reforms	0.188	−1.189***
	(.63)	(−7.18)
Control group	Matched	Matched
Controls	Yes	Yes
Fixed effects	Country, Year	Country, Year
Clustering	Country	Country

t statistics in parentheses.
*$p < 0.10$. **$p < 0.05$. ***$p < 0.01$.

interest: the effect of a change in creditor rights on bank stability, Δ^{cr} and the substitution effect ($\beta_5 - \beta_6$).

Of the 13 reform events, countries vary in terms of the number of banks. I systematically remove one of the treatment countries at a time in order to ensure that the main results are not driven by banks in any single country. Next, note that each reform corresponds to a change in one of the four components of the creditor rights index. In order to ensure that the results are not driven by changes in any single component of the index, I systematically remove them, one by one.

As in the baseline (matched control group), the effect of a change in creditor rights on bank stability is not statistically significant in any of the regressions. The result for the substitution effect remains qualitatively consistent with the baseline in each regression ($\beta_5 - \beta_6$ is always negative and statistically significant).

6.3. *Curtailed sample and rolling window volatility of* ROA

The staggered nature of the reforms means that the length of pre- and post-event windows differ for each country in the treatment group. Specifically, most of the decrease in creditor rights appear in the 1990s, while the increase in creditor rights appear in the early 2000s. This is especially important to address, as the standard deviation of *ROA* (which is an input for the main dependent variable, *Z-score*) is computed over different windows for banks in different countries, which could be problematic. As a solution, I curtail the sample by keeping only 4 pre- and post-years ($t \pm 4$) for each of the treatment countries and re-estimate the regressions.

A second issue also pertains to computing the standard deviation of *ROA*. If it is computed using the whole sample, it does not vary over time for a bank. An alternate way to compute it is to use a rolling time window (as in Schaeck and Cihak, 2012 and others). The rolling time window implies that I lose some years of observations at the beginning of the sample.

In Table 6, I present the results. In Specifications (1) and (2), I use the curtailed sample and the *Z-score* with the standard deviation of *ROA* for each bank, computed over the whole sample (same as the baseline). The results remain consistent with the substitution hypothesis ($\beta_5 - \beta_6 = -0.864$ and *t*-statistic = −3.76).

In Specifications (3) and (4), I use the *Z-score* using the 4-year rolling standard deviation of *ROA*, which reduces the sample size. The effect of a decrease in creditor rights on the market power-stability effect, β_6, still has a consistent sign (positive), but is no longer statistically significant. This is possibly because most of the decrease reforms are in the beginning of the sample (in the 90s) and I lose a large fraction of the pre-treatment years for these reforms, due to measuring the standard deviations on a rolling basis. Overall, the results remain consistent with the substitution hypothesis. The effect of market power on stability is lower when there is an increase in creditor rights versus a decrease in creditor rights ($\beta_5 - \beta_6 = -0.888$ and *t*-statistic = −2.15).

6.4. *Components of* Z-score

In this section, I replace the dependent variable, *Z-score*, with each of its three components separately, in order to understand the driving forces behind the substitution effect. The results are reported in Table 7.

The analysis of the components of the *Z-score* shows that the substitution effect is mostly (although, not entirely) driven by the *ROA*. The effect of market power on bank profits is positive, but smaller if there is an increase in creditor rights vis-á-vis a decrease in creditor rights. The effect is both economically large and statistically significant ($\beta_5 - \beta_6 = -1.92$ and *t*-statistic = −2.87). This is consistent with the argument that the substitution effect is driven by the concavity of profitability in market power or creditor rights.

The standard deviation of *ROA* is positively related to risk; therefore, we expect the opposite signs on the estimated coefficients when it is the dependent variable. Consistent with the substitution hypothesis, $\beta_5 - \beta_6$ is positive, but not statistically significant.

Finally, turning to the equity regressions, a decrease in creditor rights leads to an increase in leverage. Additionally, the substitution effect is also present ($\beta_5 - \beta_6 = -0.053$ and *t*-statistic = −2.12).

Curiously, the effect of an increase (decrease) in creditor rights is negative (positive) on bank *ROA* and equity, despite the effect being weakly opposite on bank stability (*Z-score*). This result is reconciled by the observation that an increase in creditor rights negatively affects the denominator of the *Z-score*, the standard deviation of *ROA*.

Table 6
Curtailed sample and rolling window volatility of ROA. The sample is curtailed to keep $t \pm 4$ for each treatment country. In Columns (1) and (2), the *Z*-Score measure has been computed using the standard deviation of the *ROA* over the full sample period. In Columns (3) and (4), the *Z*-Score measure has been computed using the 4-year rolling window standard deviation of *ROA*. All regressions include both bank- and country-level controls. All bank-level explanatory variables have been lagged by a year for endogeneity concerns. Δ^{cr} captures the overall effect of an increase in creditor rights on the dependent variable, relative to a decrease in creditor rights. $\beta_5 - \beta_6$ reflects the substitution effect. All regressions include year and country fixed effects and robust standard errors are clustered by country. *t-statistics* are presented in brackets.

	(1) *Z*-Score	(2) *Z*-Score	(3) *Z*-Score(roll σ)	(4) *Z*-Score(roll σ)
Lerner	0.888***	1.297***	1.091***	1.280***
	(5.01)	(4.97)	(4.76)	(7.22)
Inc*Post	0.0822	0.190**	−0.0215	−0.0592
	(1.09)	(2.03)	(−0.12)	(−0.46)
Dec*Post	−0.0627	−0.0975	−0.476	−0.563*
	(−0.53)	(−1.08)	(−1.45)	(−1.95)
Inc*Post*Lerner	−0.403**	−0.798***	−0.573**	−0.759***
	(−2.26)	(−2.97)	(−2.47)	(−3.94)
Dec*Post*Lerner	0.461*	0.158	0.315	0.106
	(1.87)	(0.56)	(0.68)	(0.24)
Δ^{cr}	−0.040	0.073	0.259	0.308
	(−0.33)	(0.61)	(0.94)	(1.26)
$\beta_5 - \beta_6$	−0.864***	−0.956***	−0.888**	−0.856**
	(−3.76)	(−4.79)	(−2.15)	(−2.13)
Control group	Matched	Full sample	Matched	Full sample
Controls	Yes	Yes	Yes	Yes
Fixed effects	Country, Year	Country, Year	Country, Year	Country, Year
Clustering	Country	Country	Country	Country
Observations	29,345	47,999	16,308	26,692
Adjusted R^2	0.039	0.049	0.028	0.030

t statistics in parentheses.
* $p < 0.10$. ** $p < 0.05$. *** $p < 0.01$.

Table 7
Components of *Z*-Score. This table contains the results for each of the three components of *Z*-Score separately. In Columns (1) and (2), the dependent variable is bank profitability, *ROA*. In Columns (3) and (4), the dependent variable is the standard deviation of *ROA*. In Columns (5) and (6), the dependent variable is the bank capital ratio, *Equity*. All regressions include both bank- and country-level controls. Δ^{cr} captures the overall effect of an increase in creditor rights on the dependent variable, relative to a decrease in creditor rights. $\beta_5 - \beta_6$ reflects the substitution effect. All regressions include year and country fixed effects and robust standard errors are clustered by country. *t-statistics* are presented in brackets.

	(1) ROA	(2) ROA	(3) $\sigma(ROA)$	(4) $\sigma(ROA)$	(5) Equity	(6) Equity
Lerner	1.583***	1.530***	−0.0200	−0.152***	0.0307***	0.0315***
	(3.92)	(4.91)	(−0.22)	(−3.67)	(3.11)	(3.48)
Inc*Post	0.339**	0.234	−0.0924	−0.113**	−0.00437	−0.00425
	(2.33)	(1.40)	(−1.54)	(−2.22)	(−0.42)	(−0.47)
Dec*Post	0.486**	0.310	0.186	0.183*	0.0396**	0.0380***
	(2.68)	(1.64)	(1.43)	(1.86)	(2.31)	(3.33)
Inc*Post*Lerner	−0.914	−0.884	0.00723	0.141	−0.0141	−0.0152
	(−1.48)	(−1.59)	(0.04)	(1.01)	(−0.66)	(−0.80)
Dec*Post*Lerner	1.017*	0.991*	−0.0198	0.126	0.0371	0.0409*
	(1.74)	(1.94)	(−0.12)	(0.93)	(1.61)	(1.79)
Δ^{cr}	−0.527***	−487***	−0.292***	−0.299***	−0.059***	−0.061***
	(−3.86)	(−3.52)	(−2.74)	(−3.31)	(−5.09)	(−4.88)
$\beta_5 - \beta_6$	−1.922***	−1.868***	0.020	0.013	−0.053**	−0.057**
	(−2.87)	(−2.94)	(0.10)	(0.07)	(−2.12)	(−2.18)
Control group	Matched	Full sample	Matched	Full sample	Matched	Full sample
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects	Country, Year	Country, Year	Country, Year	Country, Year	Country, Year	Country, Year
Clustering	Country	Country	Country	Country	Country	Country
Observations	37,019	57,020	37,232	57,447	37,200	57,307
Adjusted R^2	0.129	0.119	0.125	0.113	0.367	0.321

t statistics in parentheses.
* $p < 0.10$. ** $p < 0.05$. *** $p < 0.01$.

6.5. De-constructing market power

In this section, I test the sensitivity of bank stability with respect to different aspects of market power and report the results in Table 8.

First, in Columns (1) and (2), I use an alternate bank-level proxy for market power: the net interest margin. The results remain consistent with the substitution hypothesis. The coefficient on the interaction between *Inc*Post* and the net interest margin, β_5, is negative and statistically significant. The coefficient on the interaction between *Dec*Post* and the net interest margin, β_6, is positive as predicted, but is not statistically significant. The difference between the two is negative and statistically significant at the 5% level ($\beta_5 - \beta_6 = -0.077$ and *t*-statistic = −2.34).

Next, in Columns (3) and (4), I decompose the *Lerner* index into its individual components (Price, *P* and Marginal cost, *Mc*) and

Table 8
De-constructing market power. This table contains the results using an alternate measure for bank market power: the net interest margin (Columns (1) and (2)) and components of the Lerner index (Columns (3) and (4)). The dependent variable is the logarithm of *Z*-Score. All regressions include both bank- and country-level controls. Δ^{cr} captures the overall effect of an increase in creditor rights on the dependent variable, relative to a decrease in creditor rights. $\beta_5 - \beta_6$ reflects the substitution effect. All regressions include year and country fixed effects and robust standard errors are clustered by country. *t-statistics* are presented in brackets.

	(1) *Z*-Score	(2) *Z*-score	(3) *Z*-score	(4) *Z*-score
Nim	0.0928***	0.0937***		
	(4.22)	(5.84)		
Price			6.890*	10.76***
			(1.78)	(3.98)
Marginal cost (Mc)			−10.10**	−13.21***
			(−2.32)	(−3.97)
Inc*Post	0.280***	0.251***	−0.0293	0.0282
	(2.96)	(3.73)	(−0.22)	(0.37)
Dec*Post	0.0640	−0.0830	−0.262	−0.305
	(0.44)	(−0.56)	(−0.92)	(−1.38)
Inc*Post*Nim	−0.0858***	−0.0833***		
	(−2.96)	(−2.97)		
Dec*Post*Nim	−0.00884	−0.00891		
	(−0.32)	(−0.38)		
Inc*Post*Price			−2.311	−5.975*
			(−0.57)	(−1.92)
Dec*Post*Price			6.108	2.601
			(1.49)	(0.81)
Inc*Post*Mc			4.728	7.906**
			(1.02)	(2.00)
Dec*Post*Mc			−5.299	−2.350
			(−1.36)	(−0.71)
Δ^{cr}	0.198	0.317**	0.316	0.460**
	(1.28)	(2.14)	(1.31)	(2.24)
$\beta_5 - \beta_6$	−0.077**	−0.074**		
	(−2.34)	(−2.32)		
$\beta_5{}^p - \beta_6{}^p$			−8.419***	−8.576***
			(−3.62)	(−3.66)
$\beta_5{}^c - \beta_6{}^c$			10.027***	10.256***
			(3.28)	(3.33)
Control group	Matched	Full sample	Matched	Full sample
Controls	Yes	Yes	Yes	Yes
Fixed effects	Country, Year	Country, Year	Country, Year	Country, Year
Clustering	Country	Country	Country	Country
Observations	35,845	55,770	35,119	53,788
Adjusted R^2	0.029	0.032	0.031	0.041

t statistics in parentheses.
* $p < 0.10$. ** $p < 0.05$. *** $p < 0.01$.

interact each component with *Inc*Post* and *Dec*Post*. I estimate the following model:

$$Z_{i,t} = \gamma_j + \gamma_t + \beta_1 Inc * Post + \beta_2 Dec * Post + \sum_{x=P,Mc} \left[\beta_3{}^x x_{i,t-1} + \beta_5{}^x Inc * Post * x_{i,t-1} + \beta_6{}^x Dec * Post * x_{i,t-1}\right] + \alpha X_{i,t-1} + \delta C_{j,t} + \epsilon \quad (5)$$

Bank stability is positively related to *Price*. Consistent with the substitution hypothesis, the relationship between *Price* and bank stability is weaker when there is an increase in creditor rights, compared to the case when there is a decrease in creditor rights ($\beta_5{}^P - \beta_6{}^P = -8.42$ and *t*-statistic = −3.62). At the same time, bank stability decreases when there is an increase in *Marginal cost*. Again, the relationship is weaker when there is an increase in creditor rights, compared to the case when there is a decrease in creditor rights ($\beta_5{}^{Mc} - \beta_6{}^{Mc} = 10.03$ and *t*-statistic = 3.28). These results indicate that the substitution effect is driven by both components of market power. In other words, I find evidence of the substitution effect, regardless of whether a bank's market power increases due to an increase in the interest rate it can charge its borrowers (higher *Price*), or due to increased efficiency and cost saving (lower *Marginal cost*).

6.6. Parallel trends

In this section, I test the Parallel Trends assumption. It is important to ensure that prior to the passage of the reforms, there are similar time trends in the *Z-score* in both the treatment and control groups (Bertrand and Mullainathan, 2003).

First, I test whether the treatment and control countries differ from each other. In order to do this, I summarise the key country-level variables of non-reforming, positive reforming (increase in creditor rights) and negative reforming countries. The results are reported in Table 9. The *t*-tests of the differences in means confirm that the reforming countries are broadly similar to the non-reforming countries in the sample, as the differences are not statistically significant. This indicates that the observed results are not driven by differences across the sample of countries, but by differences in the bank-level variables.

Next, I create an indicator variable, *Post(-1)*, denoting the years 1 or 2 prior to the passage of reforms and interact it with the *Inc* and *Dec* variables. The base regression (Eq. (3)) is augmented by including *Inc* * *Post*(−1) and *Dec* * *Post*(−1) and their interactions with the *Lerner* index. If the treatment and control groups have similar time trends prior to the passage of the reforms, then the coefficients on the interaction variables will be insignificant. The results are reported in Table 10.

Table 9
Country-level variables by reforms: the first three columns contain the means and standard deviations of the country-level variable by each sub-group of countries (no reform, increases and decreases in creditor rights). In the final two columns, the differences and *t*-statistics are reported.

	No reforms Mean	Increases Mean	Decreases Mean	No reforms-increases Diff (*t*-stat)	No reforms-decreases Diff (*t*-stat)
GDP growth	3.54	3.11	4.57	0.43 (0.73)	−1.03 (−1.61)
	(1.48)	(1.462)	(1.49)		
GDP per cap	14,773	12,111	10,710	2662 (0.521)	4063 (0.641)
	(15,329)	(12,372)	(14,703)		
Inflation	6.53	9.97	7.54	−3.44 (−1.176)	−1.01 (−0.549)
	(4.72)	(7.56)	(4.23)		
Trade	80.19	65.06	83.94	15.13 (1.196)	−3.75 (−0.390)
	(41.76)	(30.05)	(19.19)		
Mcap/GDP	47.89	31.46	41.68	16.43 (1.237)	6.21 (0.460)
	(52.71)	(29.78)	(28.21)		
Observations	56	7	6		

Table 10
Parallel trends. The dependent variable is the logarithm of *Z*-score. In Columns (1) and (2), the sample is restricted to countries with increases in creditor rights and the control groups. In Columns (3) and (4), the sample is restricted to countries with decreases in creditor rights and the control groups. All regressions include both bank- and country-level controls. All bank-level explanatory variables have been lagged by a year for endogeneity concerns. All regressions include year and country fixed effects and robust standard errors are clustered by country. *t-statistics* are presented in brackets.

	(1) *Z*-score	(2) *Z*-score	(3) *Z*-score	(4) *Z*-score
Lerner	0.894***	1.310***	0.872***	1.298***
	(4.83)	(4.83)	(4.99)	(4.85)
Inc*Post	0.135	0.118		
	(1.15)	(1.15)		
Inc*Post*Lerner	−0.442**	−0.840***		
	(−2.77)	(−3.19)		
Dec*Post			−0.106	−0.264**
			(−0.75)	(−2.07)
Dec*Post*Lerner			0.774**	0.419
			(2.48)	(1.20)
Inc*Post(−1)	−0.400	−0.422		
	(−1.53)	(−1.62)		
Inc*Post(−1)*Lerner	1.586	1.152		
	(1.40)	(1.04)		
Dec*Post(−1)			0.0308	0.0256
			(0.17)	(0.14)
Dec*Post(−1)*Lerner			−0.329	−0.323
			(−1.00)	(−1.04)
Control group	Matched	Full sample	Matched	Full sample
Controls	Yes	Yes	Yes	Yes
Fixed effects	Country, Year	Country, Year	Country, Year	Country, Year
Clustering	Country	Country	Country	Country
Observations	33,493	52,147	27,058	45,712
Adjusted R^2	0.039	0.050	0.044	0.053

t statistics in parentheses.
*$p < 0.10$. **$p < 0.05$. ***$p < 0.01$.

In Specifications (1) and (2), I only include instances of increases in creditor rights and the control groups. In Specifications (3) and (4), I only include instances of decreases in creditor rights and the control groups. Indeed, I find that both coefficients on $Inc * Post(-1)$ and $Dec * Post(-1)$ and their interactions with the *Lerner* index are insignificant. This indicates that the parallel trends assumption is satisfied and the differences after the passage of reforms between the control and the treatment groups are likely to be a direct consequence of the reforms. The interaction effects, β_5 for the increases and β_6 for the decreases, have consistent signs. The coefficients are statistically significant across Specifications (1)–(3).

7. Conclusion

In this paper, I explore how bank-level stability is affected by changes in creditor rights and the interaction of creditor rights and bank market power. The analysis exploits legal reforms across 13 countries between 1995 and 2004. The proxy for bank stability is the *Z-score*, which measures the bank's distance to default. The proxy for bank market power is the *Lerner* index, which is measured at the bank-year level.

I test two key hypotheses: first, the effect of a change in creditor rights on bank risk and second, the effect of a change in creditor rights on the market power-stability relationship.

I find mixed evidence that stronger creditor rights reduce bank risk-taking (increase in distance to default). This indicates that stronger creditor rights lead to an increase in bank recovery rates in the event of borrower bankruptcy, which positively affects bank stability. However, an increase in creditor rights also reduces the positive effect of bank market power on stability. On balance, the overall effect of a change in creditor rights is not always statistically significant.

The key contribution of this paper relates to the substitution effect. I hypothesise that creditor rights and market power act as substitutes in their effects on bank risk-taking. I find strong evidence that an increase (decrease) in creditor rights reduces (increases) the effect of market power on risk-taking. The result withstands a host of robustness checks. The policy implications are

important. I present evidence of a new source of non-linearity in the market power-stability relationship. It is important for the regulator to consider the interaction effect of creditor rights and bank market power on bank stability.

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Appendix A. Sample construction: list of countries

Treatment group. Reforming countries and dates of passage of legal reforms:

Bulgaria (2000, Inc), Indonesia (1998, Dec), Israel (1995, Dec), Japan (2002, Inc), Kazakhstan (2001, Dec), Lithuania (1998, Inc), Romania (2003, Inc), Russia (2002, Inc), Spain (2004, Inc), Sweden (1995, Dec), Thailand (1999, Dec), Ukraine (1999, Dec), Uruguay (2001, Inc)

Matched control group. These countries were ex-ante equally likely to have legal reforms as the countries in the treatment countries, based on observable macroeconomic variables (Private credit to GDP, the log of equity market cap to GDP, the log of international trade, the log of GDP, the annual growth in GDP and the annual inflation)[1]:

Austria, Belgium, China, Germany, Ireland, Morocco, Nigeria, Oman, Pakistan, Poland, Portugal, Slovenia, Switzerland

Other countries. In addition to the matched countries, the overall control group includes the following countries:

Australia, Austria, Bangladesh, Belgium, Bolivia, Brazil, Canada, China, Colombia, Costa Rica, Croatia, Czech Republic, Denmark, Ecuador, Egypt, El Salvador, France, Germany, Ghana, Greece, Hong Kong, Hungary, Ireland, Italy, Jordan, Kenya, Korea, Kuwait, Latvia, Malaysia, Mexico, Morocco, Netherlands, New Zealand, Nigeria, Norway, Oman, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Portugal, Saudi Arabia, Singapore, Slovakia, Slovenia, South Africa, Sri Lanka, Switzerland, Tunisia, Turkey, UAE, UK, Vietnam.

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[1] The matched sample is taken directly from Jayaraman and Thakor (2014), for comparability across the two studies.