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The Effect of Creditor Rights on Bank Monitoring, Capital Structure and Risk-taking

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Abstract

We examine the multi-faceted effect of creditor rights on the way banks monitor, operate and finance themselves. We present a simple analytical model that shows that a strengthening of creditor rights reduces the need for banks to monitor their borrowers; and that banks, as a result, tilt their capital structures away from financing that provides the strongest monitoring incentives. To empirically examine whether this financing is deposits or equity, we use the staggered passage of legal reforms across countries as identifying variation in creditor rights, and find that banks tilt their capital structures away from equity and towards deposits when creditor rights become stronger. These results suggest that bank equity, rather than deposits, is the predominant form of monitoring-inducing financing. Next, we examine how creditor rights and the ensuing increase in bank leverage affect bank risk-taking. We find that increases in creditor rights increase bank risk-taking, but only in countries with government safety nets that encourage risk-shifting, not in countries without such incentives. We also find an increase in banks' cost of debt, but here too only in countries with government safety nets. These results indicate that lenders punish banks' higher risk-shifting propensities with higher costs of debt. Overall, our study sheds light on the complex role of country-level creditor rights on the way banks within the country function, and in doing so, contrasts the effect of creditor rights on banks from that on industrial firms.

Keywords: Bank capital, bank monitoring, creditor rights, deposit insurance

JEL Classifications: G15, G21, G32

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Abstract

We examine the multi-faceted effect of creditor rights on the way banks monitor, operate and finance themselves. We present a simple analytical model that shows that a strengthening of creditor rights reduces the need for banks to monitor their borrowers; and that banks, as a result, tilt their capital structures away from financing that provides the strongest monitoring incentives. To empirically examine whether this financing is deposits or equity, we use the staggered passage of legal reforms across countries as identifying variation in creditor rights, and find that banks tilt their capital structures away from equity and towards deposits when creditor rights become stronger. These results suggest that bank equity, rather than deposits, is the predominant form of monitoring-inducing financing. Next, we examine how creditor rights and the ensuing increase in bank leverage affect bank risk-taking. We find that increases in creditor rights increase bank risk-taking, but only in countries with government safety nets that encourage risk-shifting, not in countries without such incentives. We also find an increase in banks' cost of debt, but here too only in countries with government safety nets. These results indicate that lenders punish banks' higher risk-shifting propensities with higher costs of debt. Overall, our study sheds light on the complex role of country-level creditor rights on the way banks within the country function, and in doing so, contrasts the effect of creditor rights on banks from that on industrial firms.

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The Effect of Creditor Rights on Bank Monitoring, Capital Structure and Risk-taking

1. Introduction

How do creditor rights affect the monitoring incentives and capital structure decisions of banks? To address this question, we examine the multi-faceted effect of creditor rights on the way banks monitor, operate and finance themselves. Prior studies have primarily focused on how creditor rights affect bank loan yields (Qian and Strahan, 2007) and more recently bank risk-taking (Houston et al., 2010). We extend these studies along several dimensions. First, we study the effect of creditor rights on bank capital structure using a bank-monitoring framework. We rely on the observation that a distinguishing feature of banks is that they monitor their borrowers, and a bank's monitoring incentives depend on its capital structure (e.g. Holmstrom and Tirole, 1997). We develop a theoretical model to illustrate the idea that creditor rights reduce the marginal need for banks to monitor borrowers. The intuition is that since creditor rights increase the bank's payoffs in the bad state (i.e., when the bank does not monitor), they reduce the bank's opportunity cost of not monitoring. We model this monitoring-based effect of creditor rights on the bank's capital structure and predict that banks will tilt their capital structures away from monitoring-inducing financing when creditor rights gets stronger.

To empirically examine whether it is bank deposits or bank equity that represents monitoring-inducing financing, we use the staggered passage of legal reforms across countries as identifying variation in creditor rights. Using a difference-in-differences design, we find that increases (decreases) in creditor rights lead to banks tilting their capital structures away from (towards) equity and towards (away from) deposits. In particular, bank equity falls (rises) by 15% (18%) around increases (decreases) in creditor rights. These results indicate that, during the sample period we study and for the countries we examine, bank equity appears to be the

dominant form of financing that incentivizes bank monitoring and that banks substitute away from equity when there is a lower benefit associated with monitoring borrowers.

Next, we examine how creditor rights affect banks' risk-taking incentives. There are two factors at play here. The first is a "perfect-offset" effect, which predicts that changes in creditor rights should have no influence on bank risk-taking. This is because any increase in bank risk due to lower monitoring should be offset by higher ex-post recoveries upon borrower default. This argument does not, however, consider that the bank is now more levered which, given the presence of government safety nets, is likely to exacerbate risk-taking incentives. In other words, we expect the higher bank leverage to perturb the perfect-offset effect and tip the scales in favor of greater risk-taking, but only when government safety nets are in place. This is exactly what we find. Using cross-country heterogeneity in the presence and nature of explicit deposit insurance schemes, we find that increases in creditor rights result in an increase in risk-taking of 20%, but only in countries with government safety nets. In countries without such risk-shifting incentives, there is no detectable change in risk-taking following increases in creditor rights – as predicted by the perfect-offset effect.[1]

Third, we examine how creditor rights affect a bank's cost of debt, in order to understand the capital market implications of banks' risk-taking activities. We find, consistent with our risk-taking results, that increases in creditor rights lead to *increases* in banks' cost of debt, but only in countries with high risk-shifting incentives in place. These results suggest that investors anticipate banks' risk-taking incentives and this generates a higher cost of borrowing for banks.[2]

[1] As there is no cross-country variation in the presence of safety nets around decreases in creditor rights, we are unable to examine changes in risk-taking.

[2] Since both bank leverage and risk-taking are increasing, it could be this combination rather than risk-taking alone is driving the higher cost of debt. However, as countries with low risk-shifting incentives also experience an increase in bank leverage, but no associated increase in cost of debt, risk-taking appears to be the channel at work. However, we are circumspect in drawing strong conclusions.

These results also enable us to rule out an alternative explanation for our capital structure results, which is that these might be due to the direct effect of creditor rights on bank debt. In other words, it could be that stronger creditor rights make bank debt cheaper and more attractive for the bank, which is why we observe banks shifting away from equity. This alternative interpretation seems untenable for two reasons. First, we observe *increases* in banks' cost of debt, which is inconsistent with the direct effect of creditor rights. Second, we not only control for money market funding and subordinated debt in all the regressions, but also find that banks take on more deposits – these are not protected under bankruptcy law and should be unaffected by creditor rights.

We conclude by assessing whether the possible endogeneity of legal reform passage confounds our inferences. While all our specifications include country fixed effects that capture time-invariant differences across countries, it is possible (and quite likely) that countries initiate legal reforms in response to or in anticipation of time-varying factors such as economic growth. Although all our specifications include time-varying, macroeconomic factors such as GDP growth and inflation, we perform an additional test. We exploit differences in banks' business models to capture heterogeneity in response to our shocks. In particular, we expect the effect of creditor rights to be more pronounced for banks that are primarily lending-based as opposed to those that are fee-based. The advantage of this cross-bank variation is that it allows us to include *country-year* fixed effects that control for all time-varying, country-level factors (both observable and unobservable) that might be correlated with legal reform passage. Consistent with our prediction, we find that the effect of legal reforms is pronounced in lending-based banks.[3]

[3] It could be that countries initiate legal reforms to bring about differential effects across lending and non-lending banks. For this to confound our analysis, one needs to argue that such preemptive effects are relevant only for countries with government guarantees – which seems untenable. Another reason to doubt the plausibility of this interpretation is that the political economy of banking tends to be dictated by other concerns (too-big-to-fail, shoring up small banks) that are related to bank size, not lending focus. We find no difference in lending focus between large and small banks, further mitigating such confounding effects.

The intended contribution of our paper is threefold. We provide a theoretical model that combines the monitoring roles of bank debt and equity. In addition, ours is the first empirical test of the relative importance of bank equity and bank debt in providing monitoring incentives to banks. In contrast to the heavy emphasis in the current literature on the monitoring role of debt, we find that bank equity appears to play a more important role in encouraging bank managers to monitor their borrowers (consistent with Holmstrom and Tirole, 1997 and Mehran and Thakor, 2011). Our finding is relevant to the current regulatory debate on bank capital requirements. The conventional wisdom is that while bank equity increases stability, it has to be traded off against the higher monitoring benefits offered by bank debt. Our evidence that bank equity offers stronger monitoring incentives suggests that the observed high levels of bank leverage are probably due to reasons other than the desire to induce greater creditor discipline, such as the effects of government safety nets (e.g., Acharya and Thakor, 2012; and Farhi and Tirole, 2012), taxes, and possible behavioral biases that generate a desire for higher return on equity.[4]

Second, we show that the presence of government safety nets play a key role in how creditor rights, in conjunction with their ensuing effect on bank capital structure, influence risk-taking by banks. Our finding that a strengthening of creditor rights increases bank risk-taking and banks' cost of debt in countries with government guarantees suggests that strong creditor rights are not a universally "desirable" institutional feature;[5] and that governments need to carefully consider the unintended consequences of strengthening these rights in the presence of banking institutions that provide explicit (and implicit) guarantees to banks. Finally, our study

[4] Acharya, Mehran, Schuermann and Thakor (2012) discuss data on the intertemporal behavior of bank capital ratios, consistent with deposit insurance inducing a strong downward shift in capital ratios.
[5] Similarly, Acharya et al. (2011) show that strong creditor rights discourage innovation in firms.

highlights the uniqueness of banks by documenting how the effect of creditor rights on bank capital and risk-taking differs from that on industrial firms.

Section 2 presents the hypothesis development and the theoretical model. Section 3 presents the research design followed by the results in Section 4. Section 5 concludes.

2. Hypothesis development

The law and finance literature (starting with Laporta, Lopez-de-Silanes, Shleifer and Vishny, 1998) examines how the extent of protection afforded to creditors by the law affects the development of financial markets. This line of enquiry has proceeded in two (interconnected) strands – the effect of creditor rights on firms and its effects on banks. At some level, one would expect the findings from these strands to be consistent as the effect of creditor rights on the liability-side of firm balance sheets should mirror those on the asset-side of bank balance sheets. For example, Qi, Roth and Wald (2010) show that firms enjoy a lower cost of borrowing when creditor rights are strong, while Qian and Strahan (2007) document that banks charge lower yields on their loans in countries with strong creditor rights. There are, however, some noteworthy differences. In particular, Acharya, Amihud and Litov (2011) find that creditor rights *mitigate* risk-taking in industrial firms while Houston, Lin, Lin and Ma (2010) find that creditor rights *exacerbate* bank risk-taking.

Why do creditor rights affect the risk-taking incentives of firms and banks differently? Further, why are banks taking on *more* risk when operating in countries with stronger creditor rights? After all, any impact on bank payoffs due to riskier lending should be offset by greater ex-post recovery afforded by the stronger creditor rights. To gain a better understanding of the effect of creditor rights on banks, we posit that creditor rights also affect the liability side of banks' balance sheets, albeit via an asset-side monitoring channel. In the following sections, we

analytically develop the idea that stronger creditor rights reduce banks' need to monitor their borrowers and as a result incentivize banks to shift their capital structures away from monitoring-inducing capital to other types of capital. We briefly review prior work on the monitoring role of bank capital and follow that up with our theoretical model.

2.1. Bank capital structure and borrower monitoring

Bank capital structure plays an important role in theoretical discussions of bank monitoring. Given that borrower monitoring is costly and unobservable, theories of bank capital structure focus on how features of the capital structure encourage bank managers to monitor their borrowers. Theories examining the role of bank capital structure on bank monitoring can be broadly classified into two categories – those that emphasize the monitoring role of bank deposits, and those that focus on the monitoring role of bank equity.[6] Before discussing the details of these models, it is important to clarify what is meant by monitoring. While the details vary from model to model, we broadly construe monitoring as efforts taken by bank managers to maintain/increase the value of their relationship loans. Thus, greater monitoring means not only that bank managers increase the likelihood of making good loans, but also that they perform the due diligence that enhances the repayment likelihood of these loans. We now discuss the theoretical models in greater detail.

[6] Theories that rationalize why financial intermediaries exist (e.g., Allen (1990), and Ramakrishnan and Thakor (1984) do not focus on bank capital structure. Bank capital plays a prominent role in a recent theory of the role of banks in providing a "beliefs bridge" between pessimistic investors and optimistic entrepreneurs (see Coval and Thakor, 2005).

2.1.1. Bank deposits and monitoring

Theories positing a monitoring role for bank deposits rely on the idea that demandable deposits increase bank fragility by creating a mismatch between these short-maturity liabilities and bank assets that are generally long-term. As a result, the threat of withdrawal by depositors can trigger a bank run and force costly fire-sales or liquidations. This threat of exit by creditors creates the necessary market discipline to induce bank monitoring of its borrowers.[7]

Calomiris and Kahn (1991) provide one of the earliest theoretical analyses of the monitoring role of demandable debt. They argue that the monitoring role of debt provides an economic rationale for two common institutional features of banks – the heavy reliance on debt and the presence of the "sequential service constraint", where payments are made to demanders on a first-come-first-served basis. The banker in their model has better information about the bank's investment opportunities than depositors, but can also abscond with the proceeds. Depositors can prevent absconding by acquiring (costly) private information about asset returns and demanding liquidation if the information acquired is adverse. The sequential service constraint makes depositors' demand for liquidation credible in equilibrium, because those earlier in the queue are paid in full (including the costs of information acquisition) while those latter in the queue suffer losses. Thus, demandable deposit claims lead to greater monitoring as they mitigate the banker's ability to abscond with the assets. Diamond and Rajan (2001) use a similar reasoning to argue that the threat of a run by depositors can induce the bank's manager

[7] The threat of exit has been recently studied in the context of large shareholder monitoring of industrial firms. See Admati and Pfleiderer (2009), Edmans (2009), and Edmans and Manso (2011) for theoretical analyses and Bharath, Jayaraman and Nagar (2012) for empirical evidence.

to use his skills to collect repayment from borrowers (broadly interpreted as monitoring skills), which makes the loans liquid.[8]

2.1.2. Bank equity and monitoring

In contrast to the above theories, recent models allow for bank equity to influence bank monitoring. In these recent theories, bank fragility *weakens* monitoring incentives by lowering the likelihood that banks will be around in the future to reap the benefits of monitoring. We now briefly discuss these models.

The earliest contemporary analysis of how bank equity affects its borrowers appears in Holmstrom and Tirole (1997). In that model, higher bank equity leads to stronger bank monitoring incentives and this, in turn, improves the borrower's capital-market access as well because of an improvement in its credit worthiness. In a dynamic model of bank capital structure, Mehran and Thakor (2011) predict that greater bank equity leads to higher bank monitoring. In their model, the bank's choice of capital structure determines the amount of monitoring that it undertakes and also whether the regulator shuts down the bank at an interim stage (prior to loan maturity). The dynamic nature of the model permits an analysis of not only the direct benefit of bank equity (i.e., it allows the bank to retain a greater share of the monitoring rewards), but also of the indirect benefit (i.e., greater bank equity leads to a higher probability of survival in the future) that reinforces the ex-ante incentives to monitor.[9]

[8] Berger and Bouwman's (2009) present evidence that capital seems to positively affect liquidity creation for large banks (which represent over 81% of U.S. bank assets, based on their definition of "large") but negatively affect liquidity creation for small banks.

[9] The idea that a higher likelihood of survival in the future increases banks' ex-ante monitoring incentives can also be found in Besanko and Thakor, 1993; Boot and Greenbaum, 1993; and Boot and Thakor, 2000.

Using a one-period model, Allen, Carletti and Marquez (2011) also argue that more equity can improve bank monitoring incentives. Banks in their model can improve monitoring incentives by either taking on more equity or by increasing the loan rate. While equity encourages monitoring by forcing the bank to internalize a greater proportion of the costs of default, a higher loan rate does so by increasing the rewards to monitoring. The effectiveness of these alternatives depends on the degree of loan market competition and banks use equity (loan rate) to generate monitoring incentives when the loan market is more (less) competitive.

2.1.3. A model with both deposits-based and equity-based monitoring

Since the roles of bank deposits and bank equity have been examined in somewhat disparate models, we develop a model in which both bank equity and deposits have monitoring roles, so these can be directly compared. We first describe the basic intuition and main predictions and follow that up with the actual model. Monitoring is privately-costly for the bank, and the marginal benefit of monitoring for the bank comes via an enhancement in the borrower's repayment probability. The bank's own capital structure affects the *net* amount the bank's shareholders collect when the borrower repays, and hence influences the bank's monitoring incentives. Creditor rights determine the bank's expected payoff if the borrower defaults. Hence, the strength of the creditor rights impacts the bank's monitoring intensity as well, and this effect is mediated by the bank's capital structure. The model yields the following results:

1. As long as the threat of liquidation by creditors exists only off the equilibrium path, bank equity always provides stronger monitoring incentives than bank debt. When liquidations can occur in equilibrium, whether equity or debt provides stronger incentives depends on the exogenous parameters.

2. Stronger creditor rights lead to weaker monitoring incentives for bank equity and stronger monitoring incentives for bank debt and will thus tilt the bank's choice away from equity and towards debt.

2.1.3.1. The Model

Consider a three-date model. At $t = 0$, the bank has assets-in-place worth $L \in (0,1)$ and can make a \$1 loan to finance a borrower's project; for simplicity, the bank has no legacy debt. The borrower's project will pay off X with probability (w.p.) $p \in [0,1]$ and 0 w.p. $1 - p$. Thus, if all that the bank has access to is the borrower's project, then p is the loan repayment probability. We assume that p is affected by the bank's monitoring of the borrower, i.e., p is a function:

$$p : [0, \bar{m}] \to [0,1] \tag{A-1}$$

that maps the amount of borrower monitoring, $m \in [0, \bar{m}]$, done by the bank into a probability that the borrower will repay the loan. Assume that $p' \geq 0$, $p'' \leq 0$. The cost of monitoring for the bank's shareholders is $K(m)$, with $K' > 0, K'' > 0$, and the Inada conditions, $\lim_{m \to 0} K' = 0$, and $\lim_{m \to \bar{m}} K' = \infty$. The riskless rate is zero, there is universal risk neutrality and all financial claims are competitively priced.

Suppose that the borrower also has other assets that are worth $V > 0$ at $t = 2$. The bank could use these assets as collateral in case the project cash flow is insufficient to repay the loan and the borrower defaults. However, how much of V the bank can actually seize depends on the creditor rights in the economy. Let $q \in [0,1]$ be the fraction of V that the bank can recover in case of borrower default.

The bank may also be liquidated at an interim date $t = 1$, before the loan matures. In this case, all that can be recovered is the value of assets in place, L. The borrower cannot be asked to repay prematurely.[10] We assume that

$$L > V \tag{A-2}$$

so that liquidation would make sense at $t = 1$ if one were certain that the loan would not repay.

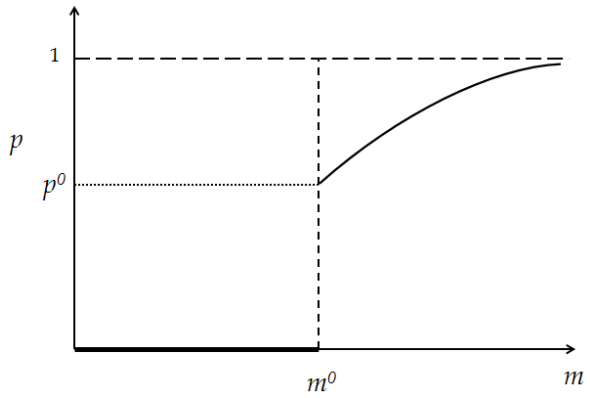
[10] Alternatively, L may be viewed as the liquidation value of the borrower's project at $t = 1$.

A. Analysis

What we will do now is to compare the monitoring incentives provided by equity and debt. Two cases are relevant: (1) the threat of liquidation by creditors exists only off the equilibrium path; and (2) the equilibrium probability of liquidation is positive.

Case 1: *Liquidation Occurs only Off the Equilibrium Path*

Suppose that the monitoring function looks like in the figure below:



So, $p = p' = 0 \; \forall \; m < m^0$ and then there is a jump in p at $m = m^0$, with $p' > 0,\; p'' < 0 \; \forall \; m > m^0$. Let p^0 be the value of p at the higher of the two values at m^0, i.e., $p(m^0) = p^0$. The motivation for such a monitoring function is that it takes a minimum level of monitoring before it becomes effective at all, and after that there are diminishing returns to scale in monitoring. Assume the project is socially efficient at $p = p^0$, i.e., $p^0 X > 1$.

Suppose first that the bank finances the project entirely by borrowing via deposits and must promise depositors D at $t = 2$ in order to raise \$1 at $t = 0$. Assume that deposits are uninsured. Further, assume:

$$L < p^0 + [1 - p^0]V \tag{A-3}$$

so that the minimal level of monitoring produces a sufficiently high repayment probability to induce depositors not to run the bank and liquidate at $t = 1$. Assume further that at $t = 1$, the depositors receive a signal $S \in \{0,1\}$. If $S = 1$, then it indicates that $m \geq m^0$ and if S = 0, then it indicates $m < m^0$. That is,

$$\phi(m) = \Pr(S = 1 \mid m) \quad = \quad \begin{cases} 1 & if \quad m \geq m^0 \\ \\ 0 & if \quad m < m^0 \end{cases} \tag{A-4}$$

Thus, the signal permits depositors to determine whether the bank's monitoring falls below m^0 or not.

We will return to the analysis of the case with bank debt shortly. But now suppose the bank finances entirely with equity. Then, in choosing its monitoring level, the bank solves:

$$\underset{m}{Max} \{p(m)X + [1 - p(m)]qV - 1 - K(m)\} \tag{A-5}$$

It will be assumed that

$$p^0 X + [1 - p^0]qV - 1 - K(m^0) > 0 \tag{A-6}$$

and

$$p'(m)[X - qV] - K'(m) > 0 \text{ at } m = m^0 \tag{A-7}$$

Condition (A-6) simply says that if the bank monitors at $m = m^0$, its participation constraint in financing the project will be satisfied, and (A-7) says that the marginal return to monitoring to the bank is positive at the minimum level of monitoring effectiveness (so there is not a corner solution at m^0 or 0). The following result can now be proved:

Proposition 1: *There is a unique optimal level of bank monitoring with equity, m_E^*, that is in the interior of $[0, \bar{m}]$, and is strictly decreasing in q.*

Proof: See Appendix.

The result that m_E^* is decreasing in q means that as creditor rights get stronger, equity-based monitoring incentives get weaker. The intuition for this result is straightforward. The benefit of bank monitoring (m_E) is that it increases the *net* payoff to the bank (i.e., what it gains by monitoring less what it loses by not monitoring). As creditor rights (q) increase the payoff that the bank can obtain when it does not monitor and the borrower defaults, creditor rights reduce the opportunity cost of not monitoring. Hence, the bank monitors less when creditor rights are stronger.

Now consider a bank that is all debt financed. This bank chooses its monitoring to solve:

$$\underset{m}{Max}\, p(m)[X - D] - K(m) \tag{A-13}$$

s.t.

$$p(m)D + [1 - p(m)]qV = 1 \tag{A-14}$$

where, D is the promised repayment to depositors.

In writing the problem this way, it has been assumed that the bank's optimal choice of monitoring, m_D^*, exceeds m^0. We will verify this shortly. We can prove the following.

Proposition 2: *There is a unique optimal level of bank monitoring with debt,* m_D^**, that is in the interior of* $[0, \bar{m}]$*, and is strictly increasing in q. Moreover,* $m^0 < m_D^* < m_E^*$.

Proof: See Appendix.

This proposition makes two predictions. First, as creditor rights become stronger, debt-based monitoring incentives increase; and second, bank equity provides greater monitoring incentives than bank debt. Let us discuss the latter first.

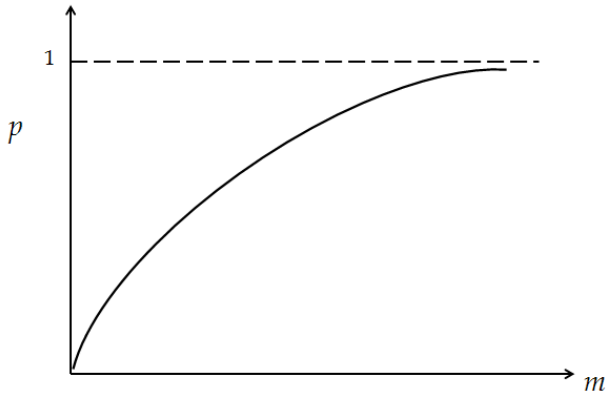
Under debt-based monitoring, the expected value accruing to bank shareholders is the project payoff less the value of debt (X–D). In contrast, under equity-based monitoring, the expected payoff to shareholders is (X-qV). Since the amount of debt (D) is greater than the salvage value of the loan (qV), the net payoff to shareholders from monitoring is lower when debt is present in the capital structure. As some of the proceeds from monitoring go to bondholders, the presence of bank debt reduces monitoring incentives compared to bank equity (this result is similar to the debt-based underinvestment problem studied in Myers, 1977). Thus, bank equity provides greater monitoring incentives than bank debt.

Turning to how creditor rights affect debt-based monitoring incentives, note that creditor rights increase the salvage value of the loan and consequently reduce the amount of bank debt required to finance the borrower's project. This reduction in the bank's need for debt mitigates the underinvestment in monitoring discussed above. Thus, stronger creditor rights increase debt-based monitoring incentives.

We see then that when the threat of liquidation by depositors is off the equilibrium path, bank equity always generates stronger monitoring incentives than bank debt. Since $m^* > m_E^* > m_D^*$, equity generates a monitoring level closer to the first-best, and will therefore by the preferred financing mode.

Case 2: *Liquidation occurs with a positive probability in equilibrium*

Suppose now that the probability of success, *p*, is increasing in m continuously and $\phi(m)$ is a continuously increasing function with $\phi' > 0, \phi'' < 0, \phi(0) = 0, \phi(m) > 0 \; \forall \; m > 0$, and $\phi(m) \in [0,1) \; \forall \; m$. Now, $\Pr(S = 1 \mid m) < 1$ for all m, so if depositors run the bank whenever *S=0*, then the probability of liquidation is positive in equilibrium.



Moreover, $p(0) = 0, p(m) > 0 \; \forall \; m > 0, p' > 0, p'' < 0$. Now, the FOC and SOC with equity will remain unchanged, but the problem with debt changes to:

$$\underset{m}{Max}\, \phi(m)p(m)[X - D] - K(m) \tag{A-17}$$

and the FOC is

$$\phi p'(m_D^*)[X - D] + p\phi'(m_D^*)[X - D] - K'(m_D^*) = 0 \tag{A-18}$$

Now, whether $m_E^* > m_D^*$ or $m_E^* < m_D^*$ depends on parameter values.

The model above is exceedingly simple, as it considers only extreme (all debt or all equity) capital structures. Nonetheless, the core intuition of the analysis is robust and transcends the model specifics. An increase in debt in the bank's capital structure reduces the bank's marginal benefit from screening the borrower when the debt is high enough. While the threat of liquidation by the creditors strengthens the bank's incentives to monitor, when the creditors' signal about whether the bank has monitored its borrower is sufficiently precise, all that the bank needs to do to eliminate this threat is to monitor at a level above the minimum threshold level m^0. Since the

bank does this anyway in equilibrium, what matters for monitoring incentives beyond that level is the marginal benefit of additional monitoring, which is greater with equity than with debt.

We can summarize the results as follows:

1. As long as the threat of liquidation by creditors exists only off the equilibrium path, bank equity always provides stronger monitoring incentives than bank debt. When liquidations can occur in equilibrium, whether equity or debt provides stronger incentives depends on the parameters.
2. Stronger creditor rights lead to weaker monitoring incentives for bank equity and stronger monitoring incentives for bank debt and will thus tilt the bank's choice away from equity and towards debt.

2.1.4. Empirical test of the theory

The main empirical prediction from our theoretical model is that strong creditor rights should be associated with less monitoring-inducing financing. The ideal regression specification to test this prediction would be as follows:

$$Equity = \alpha_0 + \alpha_1 Creditor\ rights + \alpha_2 X + \lambda_t + \epsilon \quad (1)$$

where, *Equity* is bank equity scaled by total assets, *Creditor rights* represents country-level creditor rights, *X* is a vector of bank-level and country-level controls and λ_t stands for year fixed effects. [11] The prediction from the debt-based monitoring theories would be $\alpha_1 > 0$, i.e., banks with stronger creditor rights will have more equity as these rights reduce banks' desire for monitoring

[11] See Acharya, Amihud and Litov (2011), Houston, Lin, Lin and Ma (2010), Qian and Strahan (2007), Esty and Megginson (2003) for studies using the creditor rights index in a banking context. For example, Qian and Strahan (2007) find that strong creditor rights lead to higher loan availability and lower interest rates. The impact of their findings on bank equity is not obvious, as more lending might increase the need for banks to hold equity, while lower interest rates would decrease this need.

and thus the need to have debt. The equity-based monitoring theories, on the other hand, would predict that $\alpha_1 < 0$.

The problem with using a cross-country measure of *Creditor rights* in equation (1) is that it poses a severe endogeneity problem. For example, Laporta, Lopez-de-Silanes, Shleifer and Vishny (1998) show that countries with high creditor rights also score high on other dimensions such as legal enforcement and greater protection of minority investors. Thus, investors in these countries might be more willing to invest equity in our sample banks, thereby directly affecting our dependent variable. Further, greater investor protection allows industrial firms to borrow from markets instead of relying on banks, which in turn causes unobserved heterogeneity across our sample banks' loan portfolios. As a result, these omitted variables obstruct our ability to estimate the true effects of *Creditor rights* on bank *Equity*. Thus, to satisfactorily address the endogeneity problem, we need time-series (exogenous) variation in *Creditor rights*.

To do so, we follow Djankov, McLiesh and Shleifer (2007) and use instances of legal reforms where countries either improve or retard their creditor rights as identifying variation in creditor rights. The advantage of using legal reforms is that rather than comparing bank equity across ordinal rankings of creditor rights (that generally range from 0 to 4), we compare changes in bank equity *within* countries that changed these rights, as compared to those that did not. We define *Legal reforms* as an indicator variable to denote instances when countries pass legal reforms. The reduced-form for the endogenous *Creditor rights* variable can now be written as under:

$$Creditor\ rights = \lambda_0 + \lambda_1 Legal\ reforms + \lambda_2 X + \lambda_t + \mu \quad (2)$$

where, by definition of the linear projection, $E(\mu) = 0$; $Cov(X, \mu) = 0$, and $Cov(Legal\ reforms, \mu) = 0$. The key assumption on this linear projection is that $\lambda_1 > 0$, which is reasonable given that *Legal reforms* represents changes to creditor rights.

Plugging (2) into (1), the reduced-form for bank equity (*E*) is as follows:

$$Equity = \beta_0 + \beta_1 Legal\ reforms + \beta_2 X + \lambda_t + \sigma \quad (3)$$

where, $\sigma = \omega + \alpha_1 \mu$ is the reduced form error, $\beta_1 = \alpha_1 \lambda_1$ and $\beta_2 = \alpha_2 + \alpha_1 \lambda_2$. In the above equation, σ is uncorrelated with all the explanatory variables, so we can estimate the reduced form parameters β_0, β_1 and β_2 using OLS. Finally, as *Legal reforms* varies over time within our treatment group (i.e., countries that implement these reforms), we can include country-fixed effects, which in conjunction with the year effects (λ_t) transform eq. (3) into a difference-in-differences model. Our empirical tests are, thus, based on the following specification:

$$Equity = \beta_0 + \beta_1 Legal\ reforms * Post + \beta_2 X + \lambda_t + \gamma_c + \sigma \quad (4)$$

where, *Equity* is bank equity, *Legal reforms* represents passage of legal reforms that can either strengthen or weaken creditor rights, *Post* denotes an indicator to denote the post reform period, *X* is a vector of bank-level and country-level controls, λ_t stands for year fixed effects and γ_c denotes country-fixed effects. The country fixed effects not only absorb all time-invariant variation across countries (such as rule of law, legal origin), but also whether or not countries passed legal reforms during our sample period. As a result, these fixed effects subsume the coefficient on *Legal reforms*. Similarly, the year effects absorb the coefficient on *Post*. Case 1 of our theoretical model predicts $\beta_1 < 0$, while Case 2 does not make a directional prediction.

3. Sample and variable definitions

3.1. Sample

Our data are from several sources. Dates of passage of legal reforms are obtained from Appendix A of Djankov, McLiesh and Shleifer (2007, pg. 326). Bank capital structure and other accounting data are from Bankscope, a commercial database provided by Bureau van Dijk on major international banks. Macroeconomic variables that capture differences in economic and financial development are from the World Development Indicators (WDI) database of the World

Bank. Data on the structure and functioning of the banking sector across countries are from Barth, Caprio and Levine (2001). We follow Laeven and Levine (2007) and delete banks with total asset of less than US$ 100 million, and also banks classified as "Islamic banks" since, as noted by Laeven and Levine (2007), the accounting information of these banks does not match the rest of the sample. Our final sample comprises of 74,102 bank-year observations for 12,032 unique banks across 75 countries over the period 1990 to 2009. We end the sample at 2009 as it corresponds to 5 years after the passage of the most recent legal reforms in 2004.

3.2. Variable definitions

Our dependent variable is book equity scaled by book assets (*Equity*) and follows the definition in prior studies (e.g., Mehran and Thakor, 2011; Gropp and Heider, 2010). We also examine bank deposits (*Deposits*) defined as the ratio of total deposits to total bank assets. We measure bank risk taking (*Risk taking*) using the distance to default measure, which is the inverse measure of the likelihood of insolvency and where lower values indicate greater bank risk (Roy, 1952; Boyd and Runkle, 1993; Laeven and Levine, 2009). *Risk taking* is defined as (the log of) return on assets plus the capital asset ratio divided by the standard deviation of asset returns.[12] We measure cost of debt (*Cost of debt*) using the ratio of annual interest expense to total liabilities.

We define two indicator variables, *Increase* and *Decrease*, to denote countries that undertook legal forms that improved or degraded creditor rights respectively. We also define an indicator variable, *Post*, to define the post versus pre passage periods. All three indicators are set to 0 for control banks, i.e., those that do not pass legal reforms during our sample period. The interaction terms *Increase*Post* and *Decrease*Post* denote the incremental effects of reform passage

[12] Our results are robust to using return on equity instead of return on assets.

for treatment banks as compared to those for control banks. Our design allows us to include country fixed effects that absorb *all* structural time-invariant differences in the banking sector across countries, thereby allowing us to identify based on *within-country* variation in creditor rights. Since the country-fixed effects subsume the coefficients on *Increase* and *Decrease*, while the year effects subsume the coefficient on *Post*, our difference-in-differences specification estimates only the coefficients on the interaction terms (see Bertrand and Mullainathan, 2003 for a similar design). Further, we cluster the standard errors by country.[13]

Our control variables fall into three categories –- bank-level factors, controls for economic development across countries, and variation in financial development across countries. The bank-level controls we include are the extent of money-market funding (*MM funding*), the amount of subordinated debt (*Subordinated debt*) defined as subordinated debt, hybrid capital, convertible bonds, mortgage bonds, and other bonds scaled by total assets. These two variables control for sources of bank financing other than equity and deposits. We include the log of total bank assets to control for bank size (*Log assets*), growth defined as the annual change in total revenues (*Revenue change*), bank profitability defined as return on equity (*ROE*), the proportion of loan loss provisions to net income to capture health of the loan portfolio (*LLP*) and the bank's market share of the country's deposits defined annually (*Market share*).

Prior studies (e.g., Flannery and Rangan, 2008) have found that larger banks hold less equity, so we expect a negative coefficient on *Log assets*. If dividends tend to be sticky, then more profitable banks will accumulate equity faster, which leads to the prediction of a positive coefficient on *ROE* (e.g., Flannery and Rangan, 2008; Nier and Baumann, 2006; Berger, Herring and Szego, 1995). A similar argument extends to bank growth, so the coefficient on *Growth* is

[13] Our results are robust to clustering the standard errors by bank.

expected to be positive. While a higher loan loss provision reduces equity, the two could also be positively associated if riskier banks make greater provisions and also hold more equity (e.g., Nier and Baumann, 2006; Ayuso, Perez and Saurina, 2004). We therefore do not make a directional prediction on *LLP*. Finally, if banks use market power and equity as alternative mechanisms for monitoring as predicted by Allen, Carletti and Marquez (2011), we would expect a negative coefficient on *Market share*.

Turning to the country-level controls, we include both the level of GDP (*Log GDP*) as well as annual growth in GDP (*GDP growth*) to capture differences in economic development across countries. We also control for the annual rate of inflation (*Inflation*). Further, we control for differences in financial market development across countries by including the log of the ratio of equity market cap of listed companies to GDP (*Log equity market cap*), the log of stock market turnover of listed firms to GDP (*Log turnover*) and the log of international trade (*Log trade*) defined as the sum of exports and imports divided by GDP. As these variables are defined at an annual frequency for each country, they are identified in the presence of country fixed effects.

Making ex-ante predictions on the signs of the country-level controls is more difficult. Our intent here is to ensure that we are appropriately capturing additional *time-varying* macroeconomic factors that might be correlated with countries' decisions to pass legal reforms.

4. Results

4.1. Summary statistics

Table 1 presents the summary statistics of the sample. The average bank funds around 8.4% of its assets using equity, and around 74.8% using deposits. With respect to bank risk-taking, the median *Zscore* of 3.704 indicates that bank profits have to fall by 40 standard deviations before they can wipe out both capital and profits. However, there is wide heterogeneity in risk-taking

across the sample banks. Profits have to fall only by 0.8 standard deviations in the riskiest bank as compared to 681 standard deviations in the safest bank. The average bank pays an annual interest cost of 3.9% of total liabilities and finances around 4.5% of its asset base using money-market funding and 7.5% using subordinated debt and bonds. The sample also exhibits wide cross-sectional variation in bank size with the average bank having assets of US$1.6 billion (exp (7.4)). The smallest bank in the sample has assets of US$116 million while the largest bank has US$ 366 billion. Revenue change in the average bank is almost stagnant with a small decline of 0.2%. This bank has a return on equity of 8.6%, loan loss provisions that amount to 18.4% of net income and a 1% market share of the country's annual deposits.

Turning to the country-level variables, the economy-wide indicators depict modest growth with the annual growth in GDP amounting to 2.1% and an annual inflation rate of 3.4%. Finally, the average equity market cap, turnover and international trade are 59%, 80% and 53% of GDP respectively. Overall, our sample depicts rich heterogeneity with respect to bank-level characteristics such as capital, size and profitability as well as macro-level factors such as economic and financial development.

Table 2 presents the list of countries in the sample. The sample is comprehensive and covers 75 countries around the world. Columns entitled *Inc* and *Dec* indicate countries that either increased or decreased creditor rights during the sample period along with the year of passage. Djankov et al. (2007) list 32 instances of legal reforms over the period 1978 – 2004. Out of these, we exclude 8 instances (Austria in 1982, Denmark in 1984, United Kingdom in 1985, Ireland in 1990, Canada in 1992, India in 1993, Russia in 1994, and Romania in 1994) where the year of passage does not allow enough observations in the pre-period. Further, we exclude 5 instances (Armenia, Azerbaijan, Mongolia, Niger and Malawi) that are not on Bankscope.

Of the remaining 19 instances, Japan weakened creditor rights in 2000 but strengthened them shortly thereafter in 2002. To clearly identify the latter, we drop observations for Japanese banks prior to 2000. Similarly, since Kazakhstan strengthened creditor rights in 1997 and 1998 only to weaken them subsequently in 2001, we retain observations from 1997 onwards to identify the latter. [14] Further, we combine the two closely occurring instances of creditor rights increases for Lithuania (in 1995 and 1998) into the latter. Finally, while Russia weakened creditor rights in 1998 and strengthened them in 2004, we use the latter as most observations for Russian banks fall in the post 1998 period.

Our final sample comprises of 14 instances of legal reforms (Bulgaria in 2000, Finland in 1993, Indonesia in 1998, Israel in 1995, Japan in 2002, Kazakhstan in 2001, Lithuania in 1998, Romania in 2003, Russia in 2004, Spain in 2004, Sweden in 1995, Thailand in 1999, Ukraine in 1999 and Uruguay in 2001). As can be seen, the event years are fairly scattered over the sample period, which further aids in identification. The final column categorizes countries into high (H) and low (L) risk-shifting groups based on the extent of government safety nets in place.

4.2. Graphical evidence

Before discussing regression results, we present graphical evidence in *Figure 1*. Countries passing legal reforms are split into those that increase creditor rights (*Increase*) and those that reduce them (*Decrease*). The x-axis plots the pre-versus post-passage periods, where these periods are defined relative to the year of passage. For countries that did not pass reforms (*Control*), the pre and post periods are defined relative to 1999 (the middle of the sample period). The y-axis plots average values of bank equity (*Equity*) in Panel A and bank deposits (*Deposits*) in Panel B, both orthogonalized with respect to all controls and country fixed effects.

[14] Our results are robust to identifying the former event in each case.

The main message from the graphs is evident -– banks in countries that initiated creditor rights-increasing reforms experienced a drop in bank equity and an increase in bank deposits. On the other hand, those with creditor rights-decreasing reforms experienced an increase in bank equity and decrease in bank deposits. These changes are more pronounced than those for control banks, which show essentially no change between these periods.

4.3. Multivariate evidence

Table 3 presents the results. We present two sets of specifications. The first pertains to bank equity (*Equity*) while the next to bank deposits (*Deposits*). The first two regressions introduce the interaction terms *Increase*Post* and *Decrease*Post* individually while the last one includes both together. The coefficient on *Increase*Post* is negative and significant while that on *Decrease*Post* is positive and significant in the *Equity* regressions. In terms of economic significance, given the pre-passage mean *Equity* of 7.78%, the coefficient of -1.146 on *Increase*Post* in Model (3) signifies a 15% decrease in equity while that on *Decrease*Post* indicates an 18% increase. Turning to the *Deposit* results, the coefficient on *Increase*Post* is positive and significant while that on *Decrease*Post* is negative and significant in all specifications. These results indicate that increases (decreases) in creditor rights lead to banks shifting their capital structures away from equity (deposits) and towards deposits (equity). More importantly, they indicate that bank equity appears to be primary form of monitoring-inducing financing, given that they substitute away from equity when strong creditor rights provide them with a lower need to monitor their borrowers.

4.4. Creditor rights and bank risk-taking

We now turn to bank risk-taking. To ensure that our inferences are not confounded by the recent financial crisis, we restrict the sample period in these tests until 2005. We begin with first examining how changes in creditor rights affect bank risk-taking in the entire sample. We then examine how the presence of government safety nets influence this overall effect. We do so in two ways – first we decompose legal reformers into high and low risk shifting groups and estimate the primary specification using these two indicators. Second, we split the entire sample into high and low risk-shifting groups and examine the effect of legal reform passage within each sub-sample. The advantage of the latter design is that it also allows the effect of all the control variables to vary between the high and low risk-shifting groups.

We categorize countries into high and low risk-shifting groups based on data from Demirguc-Kunt and Huizinga (2004) on the presence of an explicit deposit insurance scheme and whether countries' insurance premiums are risk-adjusted. High risk-shifting countries are those with an explicit deposit insurance scheme and where the premiums are not risk-adjusted, while all other countries are classified as low risk-shifters. Given the lack of variation in risk-shifting incentives within countries that decreased creditor rights, we focus on increases.

Table 4 presents these results. Model (1) presents the effect of increases in creditor rights on bank risk-taking for the entire sample. The coefficient on *Increase*Post* is negative but insignificant, indicating that increases in creditor rights result, *on average*, in no observable change in risk-taking. The picture, however, changes starkly when we condition on variation in risk-shifting incentives. Model (2) presents results that split the *Increase* group into those with high risk-shifting incentives (*Increase_HighIncent*) versus those with low incentives (*Increase_LowIncent*). We find increases in risk-taking amongst countries with government safety nets that provide high risk-shifting incentives; while those with low risk-shifting incentives

experience a weak decrease in risk-taking. In particular, the coefficient on *Increase_HighIncent*Post* is negative and highly significant (lower values of *Zscore* indicate greater risk), while that on *Increase_LowIncent*Post* is positive and weakly significant. Further, these coefficients are significantly different from each other (*p*. value = 0.009). These inferences come through even in the individual sub-sample tests. In particular, the coefficient on *Increase*Post* is negative and highly significant in the *HighIncent* sub-sample, while it now becomes insignificant in the *LowIncent* sub-sample. Overall, these results indicate that government safety nets play a key role in determining the risk-taking responses of banks to a strengthening of creditor rights. In countries with safety nets that provide risk-shifting incentives, strengthening of creditor rights leads to banks taking on more risk. On the other hand, there is no observable change in risk-taking after creditor rights increases in countries without government safety nets.

4.5. Creditor rights and bank cost of debt

We now turn to how creditor rights affect the cost of bank debt. We do this for two reasons. First, it provides evidence of the capital market implications of bank risk-taking; and second, it helps mitigate concerns that our results might be driven by the direct effect of creditor rights on bank capital structure.

If stronger creditor rights induce creditors to reduce their monitoring of the bank and this increases bank risk-taking either directly or through lower bank monitoring of borrowers, then we expect bank lenders to price-protect themselves by charging a higher interest rate. In other words, we expect the strengthening of creditor rights to *increase* banks' cost of debt, especially in countries with government safety nets. Note that this prediction is diametrically opposite to how creditor rights affect industrial firms. In particular, stronger creditor rights *lower* industrial firms' cost of debt due to the greater protection afforded to lenders. This lowering of financing-

constraints channel would predict a similar lowering of interest cost for the bank, in case of the direct effect. However, our monitoring story predicts that banks' cost of debt would increase, and that too, only in countries with high risk-shifting incentives. To test these predictions, we regress *Cost of debt* on *Increase*Post* and controls.

Table 5 presents these results. Consistent with our predictions, we find that the coefficient on *Increase*Post* is positive and significant in the overall sample, indicating that a strengthening of creditor rights *increases* banks' cost of debt. Further, results from Model (2) indicate that this increase emanates from countries with high risk-shifting incentives, which are the very places where banks are also taking on more risk. In particular, the coefficient on *Increase_HighIncent*Post* is positive and significant, while that on *Increase_LowIncent*Post* is insignificant. Finally, these inferences are robust to using the split-sample design – the coefficient on *Increase*Post* is positive and significant in the *HighIncent* sub-sample but insignificant in the *LowIncent* sub-sample. Overall, these results provide capital market consequences of higher bank risk-taking in response to increases in creditor rights. More importantly, they indicate that our results are not driven by the direct effect of creditor rights on bank capital structure.

4.6. Endogeneity of legal reform passage

In this section, we examine the concern that the passage of legal reforms is itself endogenous and could confound our inferences. As noted before, while we include country fixed effects in all our specifications, these do not capture time-varying country-level factors that might influence a country's decision to modify its creditor rights.

A potential solution is to exploit cross-bank variation in response to these shocks, which we do using differences in banks' business models. In particular, we predict that the effect of creditor rights will be stronger for banks that are in the business of making loans rather than those

that are in the trading business. To capture lending-based versus fee-based banks, we define *Lend* as the proportion of interest revenue to total revenue (i.e., interest revenue, trading income and fees and commissions) and interact it with our shock. The coefficient on *Increase*Post*Lend* captures the incremental effect of creditor right increases on lending-based banks as compared to fee-based banks. In addition to country-year fixed effects (that subsume the coefficient on *Increase*Post*), we also include bank fixed effects to capture all time-invariant differences across banks within each country; and additionally interact *Lend* with *Increase* and with *Post* (see Gormley and Matsa, 2013 for a nice discussion of two-dimensional, high-frequency fixed effects).

Table 6 presents these results. The first set of specifications presents results for bank *Risk taking* while the next set for those pertaining to *Cost of debt*. Consistent with our previous tests, we conduct separate analyses for the high and low risk-shifting groups. Consistent with our expectation, the effect of creditor right increases is stronger for lending-based banks relative to fee-based banks. In particular, the coefficient on *Increase*Post*Lend* is negative and significant in the risk-taking specification, and positive and significant in the cost of debt specification, but only for countries with high risk-shifting incentives. Consistent with our previous results, there is no elevated risk-taking or cost of debt (in lending-based banks) that are domiciled in countries with low risk-shifting incentives.

One concern is that countries might be initiating legal reforms to achieve desired outcomes in lending banks. In that case, the endogeneity problem persists. We find this possible interpretation unlikely for two reasons. First, one would have to argue that such preemptive passage of reforms is more likely to occur in countries with government safety nets – which seems untenable. Second, the political economy of banking tends to be driven by other factors related to bank size (such as too-big-to-fail, shoring up small banks) rather than lending focus. To ensure that bank size is not correlated with lending focus, we compare the ratio of interest revenue to

total revenue across the smallest and largest deciles of banks in our sample. We find no evidence of any systematic differences in lending focus across these deciles. The proportion of interest revenue to total revenue is around 77% for the smallest banks and 76% for the largest ones. Overall, these results provide assurance that our inferences are not confounded by the endogeneity of legal reform passage.

4.7. Using loan portfolio risk to measure risk-taking

We have thus far relied exclusively on the distance-to-default measure to capture bank risk-taking. While this is a comprehensive measure of risk-taking, it requires five years of historical data, which could pose survivorship bias. To mitigate this concern, we follow Berger, Klapper and Ariss (2008) and use the ratio of non-performing loans to total loans (*Non performing loans*) as an alternative measure of bank-risk taking. While this measure is available at an annual frequency, it captures only loan portfolio risk and not overall bank risk. Further, these data are not reported for all banks, which limits the generalizability of our results.

With the above caveats in mind, we present results in the last set of specifications in Table 6. We are careful to expand our sample to also include banks with less than five years' data. Consistent with our earlier results, we find that the coefficient on *Increase*Post*Lend* is positive and significant in countries with high risk-shifting incentives; but negative and insignificant in countries with low risk-shifting incentives. Further, these coefficients are statistically different from each other. These results indicate that stronger creditor rights increase loan portfolio risk, but only when government guarantees are in place. More importantly, these results provide assurance that our results do not hinge on how we measure bank risk-taking.

5. Conclusion

We examine the effect of country-level creditor rights on bank capital structure, bank risk-taking and cost of debt using a bank-monitoring framework. We develop a simple theoretical model in which both bank equity and deposits play monitoring roles and find that stronger creditor rights reduce the bank's need to monitor its borrowers, which in turn, reduces its demand for monitoring-inducing financing. Using the staggered passage of legal reforms as identifying variation in creditor rights, we find that banks tilt their capital structures away from equity and towards deposits as creditor rights become stronger. We interpret these results as evidence that bank equity is the dominant source of monitoring-inducing financing, and that banks substitute away from it when there is a lower need to monitor their borrowers.

The above shift in capital structure, in combination with the lower monitoring afforded by a strengthening of creditor rights, lead to higher bank risk-taking but only in countries with government safety nets in place. These results highlight the complex interaction between country-level corporate governance features and characteristics of the political economy within which banks operate. We show that this concoction, can at times, result in seemingly "good" outcomes such as a strengthening of creditor rights bring about unintended consequences in the form of greater bank risk-taking and higher cost of bank debt. Given the pivotal role of banks in the economy, we hope that our study spurs further research on a host of related issues such as the effect of these interactions on bank liquidity creation and economic growth. We hope, in future research, to explore the economic reasons, apart from the distorting effects of government safety nets, for the apparent reluctance of banks to hold equity, and capital-structure spillover effects across banks when multiple banks monitor the same group of borrowers.

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Table 1: Descriptive statistics

The sample comprises of 74,102 bank-year observations for 12,032 unique banks during the period 1990 to 2009. *Equity* denotes bank equity scaled by total assets. *Deposits* represents deposits scaled by total assets. *Risk taking* denotes bank risk-taking measured using the distance-to-default measure. It is computed as (the log of) capital plus ROA scaled by the standard deviation of ROA, based on five annual observations. *Cost of debt* denotes the cost of bank debt and is defined as the ratio of interest expense to total liabilities. *MM funding* denotes money market funding and is defined as the sum of commercial paper, certificates of deposit, securities loaned and other negotiable instruments divided by total assets. *Subordinated debt* indicates the ratio of subordinated debt, hybrid capital, convertible bonds, mortgage bonds, and other bonds divided by total assets. *Log assets* denotes bank size defined as the log of total assets. *Revenue change* indicates the annual percentage change in revenues. *ROE* denotes bank profitability defined as net income divided by average equity. *LLP* is the ratio of the bank's loan loss provision to net interest income. *Market share* is the ratio of the bank's share of total deposits in the country each year. *Log GDP* denotes the log of GDP, while *GDP growth* denotes the annual growth in GDP. *Inflation* denotes annual inflation. These variables are defined annually and obtained from the World Development Indicators (WDI) database of the World Bank. *Log equity market cap* and *Log turnover* indicate the log of the ratio of equity market cap to GDP and turnover of listed stocks to GDP of the country respectively. *Trade* indicates international trade and is computed as the ratio of imports plus exports to GDP. These variables are obtained from WDI and are averaged over the entire sample period. All explanatory variables have been lagged by a year.

	Obs.	**Mean**	**Median**	**S.D.**	**Min.**	**Max.**
Bank-level variables:						
Equity (%)	74,102	8.433	6.745	5.583	1.502	44.424
Deposits (%)	74,102	74.837	81.705	19.217	2.333	95.646
Risk taking	74,102	3.704	3.723	1.137	0.595	6.525
Cost of debt (%)	74,102	3.920	3.312	2.817	0.064	21.494
MM funding (%)	74,102	4.467	0.000	10.246	0.000	62.050
Subordinated debt (%)	74,102	7.472	2.671	11.974	0.000	70.598
Log assets	74,102	7.402	7.075	1.782	4.760	12.811
Revenue change (%)	74,102	-0.200	-2.117	22.491	-67.384	129.182
ROE (%)	74,102	8.614	7.120	11.147	-46.390	49.910
LLP (%)	74,102	18.365	13.365	25.358	-39.060	172.770
Market share (%)	74,102	1.048	0.037	3.009	0.000	19.530
Country-level variables:						
Log GDP	74,102	6.376	7.002	1.436	2.411	8.545
GDP growth (%)	74,102	2.068	1.831	2.231	-6.182	9.317
Inflation (%)	74,102	3.380	1.874	5.265	-1.773	33.954
Log equity market cap	74,102	0.465	0.410	0.282	0.047	1.411
Log turnover	74,102	0.595	0.584	0.285	0.019	1.185
Log trade	74,102	0.429	0.391	0.169	0.152	1.153

Table 2: List of countries and legal reforms

This panel provides the list of the sample countries. *Inc* and *Dec* denote legal reforms that increased or decreased creditor rights respectively. The year of passage is indicated in the adjoining columns. "Risk shift" indicates whether countries have high (H) or low (L) risk-shifting incentives due to the presence of government safety nets based on data from Demirguc-Kunt and Huizinga (2004).

Country	**Obs**	***Inc***	**Year**	***Dec***	**Year**	**Risk shift**	**Country**	**Obs**	***Inc***	**Year**	***Dec***	**Year**	**Risk shift**
Argentina	764	0		0		Low	Lebanon	342	0		0		High
Australia	780	0		0		Low	Lithuania	125	1	1998	0		High
Austria	2322	0		0		High	Malaysia	987	0		0		Low
Bangladesh	239	0		0		High	Mexico	452	0		0		High
Belgium	937	0		0		High	Morocco	185	0		0		Low
Bolivia	105	0		0		Low	Netherlands	536	0		0		High
Brazil	1364	0		0		High	New Zealand	175	0		0		Low
Bulgaria	175	1	2000	0		Low	Nigeria	407	0		0		High
Canada	661	0		0		High	Norway	1130	0		0		High
Chile	455	0		0		High	Oman	124	0		0		High
China	515	0		0		Low	Pakistan	308	0		0		Low
Colombia	364	0		0		High	Panama	414	0		0		Low
Costa Rica	167	0		0		Low	Paraguay	34	0		0		Low
Croatia	296	0		0		High	Peru	293	0		0		Low
Czech Rep.	244	0		0		High	Philippines	523	0		0		High
Denmark	1299	0		0		High	Poland	484	0		0		High
Ecuador	145	0		0		High	Portugal	637	0		0		Low
Egypt	342	0		0		Low	Romania	159	1	2003	0		Low
El Salvador	123	0		0		Low	Russia	1309	1	2004	0		Low
Finland	212	0		1	1993	Low	Saudi Arabia	150	0		0		Low
France	5573	0		0		High	Singapore	209	0		0		Low
Germany	20254	0		0		High	Slovakia	198	0		0		High
Ghana	148	0		0		Low	Slovenia	250	0		0		Low
Greece	362	0		0		High	South Africa	381	0		0		Low
Hong Kong	622	0		0		Low	Spain	2833	1	2004	0		High
Hungary	249	0		0		Low	Sri Lanka	190	0		0		High
Indonesia	556	0		1	1998	Low	Sweden	765	0		1	1995	Low
Ireland	243	0		0		High	Switzerland	3784	0		0		High
Israel	241	0		1	1995	Low	Thailand	445	0		1	1999	Low
Italy	6803	0		0		Low	Tunisia	249	0		0		Low
Jamaica	152	0		0		High	Turkey	419	0		0		Low
Japan	4403	1	2002	0		High	Ukraine	233	0		1	1999	High
Jordan	186	0		0		Low	UAE	149	0		0		Low
Kazakhstan	109	0		1	2001	Low	UK	2388	0		0		High
Kenya	198	0		0		High	Uruguay	58	1	2001	0		Low
Korea	413	0		0		High	Venezuela	304	0		0		High
Kuwait	112	0		0		Low	Vietnam	137	0		0		Low
Latvia	203	0		0		High							
							Total	**74,102**					

Table 3: Effect of legal reforms on bank equity and bank deposits

The dependent variable in Models (1)-(3) is bank equity (*Equity*) while it is bank deposits (*Deposits*) in Models (4)-(6). *Increase* (*Decrease*) is an indicator variable representing countries that pass legal reforms that increase (decrease) creditor rights. *Post* denotes the pre vs. post period relative to the year of passage. *MM funding* denotes money market funding while *Subordinated debt* indicates subordinated debt, hybrid capital, convertible bonds, mortgage bonds, and other bonds. *Log assets* denotes bank size. *Revenue change* indicates the annual percentage change in revenues. *ROE* denotes bank profitability. *LLP* is the bank's loan loss provision. *Market share* is the bank's share of total deposits. *Log GDP* denotes the log of GDP, while *GDP growth* denotes the annual growth in GDP. *Inflation* denotes annual inflation. *Log equity market cap* and *Log turnover* indicate the log of equity market cap and turnover of listed stocks respectively. *Trade* indicates the log of international trade. All explanatory variables have been lagged by a year. All regressions include year and country fixed effects and robust standard errors clustered by country (reported under the coefficients in parentheses). ***, ** and * denote significance at the 1%, 5% and 10% levels respectively.

	Equity			*Deposits*		
	(1)	(2)	(3)	(4)	(5)	(6)
*Increase*Post*	-1.144**		-1.146**	1.564**		1.566**
	(.568)		(.566)	(.645)		(.642)
*Decrease*Post*		1.565***	1.572***		-1.842**	-1.852**
		(.398)	(.390)		(.749)	(.736)
MM funding	-.020	-.020	-.020	-1.000***	-1.000***	-.999***
	(.014)	(.014)	(.014)	(.047)	(.047)	(.047)
Subordinated debt	-.011	-.011	-.010	-.965***	-.965***	-.965***
	(.017)	(.017)	(.017)	(.030)	(.030)	(.030)
Log assets	-.880***	-.880***	-.882***	.438***	.438***	.441***
	(.150)	(.151)	(.150)	(.126)	(.127)	(.127)
Revenue change	.010***	.009***	.010***	.011***	.011***	.011***
	(.001)	(.001)	(.001)	(.004)	(.004)	(.004)
ROE	.006	.006	.006	-.035	-.035	-.035
	(.009)	(.009)	(.009)	(.022)	(.022)	(.022)
LLP	.001	.002	.002	-.013	-.013	-.013
	(.004)	(.004)	(.004)	(.009)	(.009)	(.009)
Market share	-.091**	-.090**	-.088**	.165***	.164***	.162***
	(.044)	(.045)	(.045)	(.053)	(.053)	(.053)
Log GDP	2.227	1.763	2.011	1.781	2.374	2.035
	(1.866)	(1.986)	(1.878)	(3.938)	(3.993)	(3.961)
GDP growth	-.077**	-.067*	-.074*	-.069	-.083	-.072
	(.038)	(.040)	(.038)	(.072)	(.072)	(.073)
Inflation	.017	.020	.015	-.075***	-.079***	-.073**
	(.017)	(.019)	(.017)	(.029)	(.029)	(.029)
Log equity market cap	.258	-.048	.379	.287	.728	.144
	(1.049)	(1.021)	(1.064)	(1.300)	(1.245)	(1.331)
Log turnover	.229	.146	.240	1.047	1.163	1.035
	(.582)	(.575)	(.571)	(.963)	(.973)	(.956)
Log trade	2.678	2.395	2.369	.101	.428	.465
	(2.214)	(2.365)	(2.267)	(4.532)	(4.683)	(4.566)
Year effects	Y	Y	Y	Y	Y	Y
Country effects	Y	Y	Y	Y	Y	Y
Obs.	74102	74102	74102	74102	74102	74102
Adj. R^2	.329	.328	.329	.824	.824	.824

Table 4: Creditor rights, bank risk-taking and government safety nets

The dependent variable is bank risk-taking (*Risk taking*) defined as (the log of) capital plus ROA scaled by standard deviation of five annual ROAs. *Increase_HighIncent* (*Increase_LowIncent*) denotes countries that increased creditor rights and have high (low) risk-shifting incentives due to government safety nets based on Demirguc-Kunt and Huizinga (2004). All other variables are as defined in Table 3. All explanatory variables have been lagged by a year. All regressions include year and country fixed effects and robust standard errors clustered by country (reported under the coefficients in parentheses). ***, ** and * denote significance at the 1%, 5% and 10% levels respectively.

	Entire sample		Sub-samples	
			HighIncent	*LowIncent*
	(1)	(2)	(3)	(4)
*Increase*Post*	-.118		-.174**	.248
	(.105)		(.071)	(.154)
*Increase_HighIncent*Post*		-.185**		
		(.072)		
*Increase_LowIncent*Post*		.249*		
		(.150)		
MM funding	-.002	-.002	-.003	.002
	(.003)	(.003)	(.004)	(.002)
Subordinated debt	.004	.004	.005	.002
	(.005)	(.005)	(.007)	(.002)
Log assets	-.005	-.005	-.008	-.007
	(.030)	(.030)	(.043)	(.016)
Revenue change	-.0008**	-.0008**	-.001***	-.0004
	(.0003)	(.0003)	(.0004)	(.0004)
ROE	.003	.003	.003	.003
	(.003)	(.003)	(.004)	(.002)
LLP	-.006***	-.006***	-.006***	-.005***
	(.0009)	(.0009)	(.001)	(.001)
Market share	.006	.006	.003	.010*
	(.007)	(.007)	(.009)	(.006)
Log GDP	1.157**	1.089**	1.239**	1.112**
	(.471)	(.478)	(.575)	(.556)
GDP growth	-.007	-.006	-.003	-.009
	(.009)	(.009)	(.010)	(.008)
Inflation	-.001	-.0007	.005	-.011**
	(.004)	(.004)	(.005)	(.005)
Log equity market cap	.213	.208	-.087	.435**
	(.205)	(.204)	(.225)	(.204)
Log turnover	.072	.080	.168*	-.035
	(.132)	(.132)	(.099)	(.142)
Log trade	-.974*	-.951*	-.574	-2.150***
	(.546)	(.542)	(.724)	(.604)
p. val. of diff.		0.009	0.014	
Year effects	Y	Y	Y	Y
Country effects	Y	Y	Y	Y
Obs.	55721	55721	41558	14163
Adj. R^2	.269	.269	.242	.296

Table 5: Creditor rights and bank cost of debt

The dependent variable is the cost of bank debt (*Cost of debt*) defined as interest expense divided by total liabilities. *Increase_HighIncent* (*Increase_LowIncent*) denotes countries that increased creditor rights and have high (low) risk-shifting incentives due to the presence of government safety nets. All other variables are as defined in Table 3. All explanatory variables have been lagged by a year. All regressions include year and country fixed effects and robust standard errors clustered by country (reported under the coefficients in parentheses). ***, ** and * denote significance at the 1%, 5% and 10% levels respectively.

	Entire sample		Sub-samples	
			HighIncent	*LowIncent*
	(1)	(2)	(3)	(4)
*Increase*Post*	.936**		1.234***	-.861
	(.394)		(.181)	(.606)
*Increase_HighIncent*Post*		1.246***		
		(.220)		
*Increase_LowIncent*Post*		-.754		
		(.534)		
MM funding	.006	.006	.009**	.003
	(.004)	(.004)	(.004)	(.008)
Subordinated debt	.022***	.022***	.029***	.018**
	(.005)	(.005)	(.006)	(.007)
Log assets	.008	.008	-.015	-.005
	(.043)	(.043)	(.043)	(.074)
Revenue change	.008***	.008***	.010***	.005***
	(.001)	(.001)	(.001)	(.001)
ROE	-.013***	-.013***	-.013***	-.014***
	(.003)	(.003)	(.003)	(.004)
LLP	.004***	.004***	.003*	.006***
	(.001)	(.001)	(.001)	(.002)
Market share	-.036***	-.036***	-.032**	-.034**
	(.012)	(.012)	(.015)	(.016)
Log GDP	-3.078**	-2.761*	-4.788**	.653
	(1.506)	(1.557)	(2.015)	(1.476)
GDP growth	-.167***	-.168***	-.204***	-.139***
	(.030)	(.030)	(.065)	(.021)
Inflation	.061***	.060***	.052**	.069***
	(.016)	(.016)	(.021)	(.021)
Log equity market cap	-.463	-.439	-.499	-.520
	(.610)	(.612)	(.674)	(.737)
Log turnover	-.468	-.504	-.044	-.883*
	(.565)	(.562)	(.685)	(.521)
Log trade	3.101	2.994	2.695	-2.834
	(3.094)	(3.115)	(3.032)	(2.767)
p. val. of diff.		0.001	0.001	
Year effects	Y	Y	Y	Y
Country effects	Y	Y	Y	Y
Obs.	55721	55721	41558	14163
Adj. R^2	.64	.641	.663	.603

Table 6: Within-country-across-bank variation: Lending versus non-lending banks

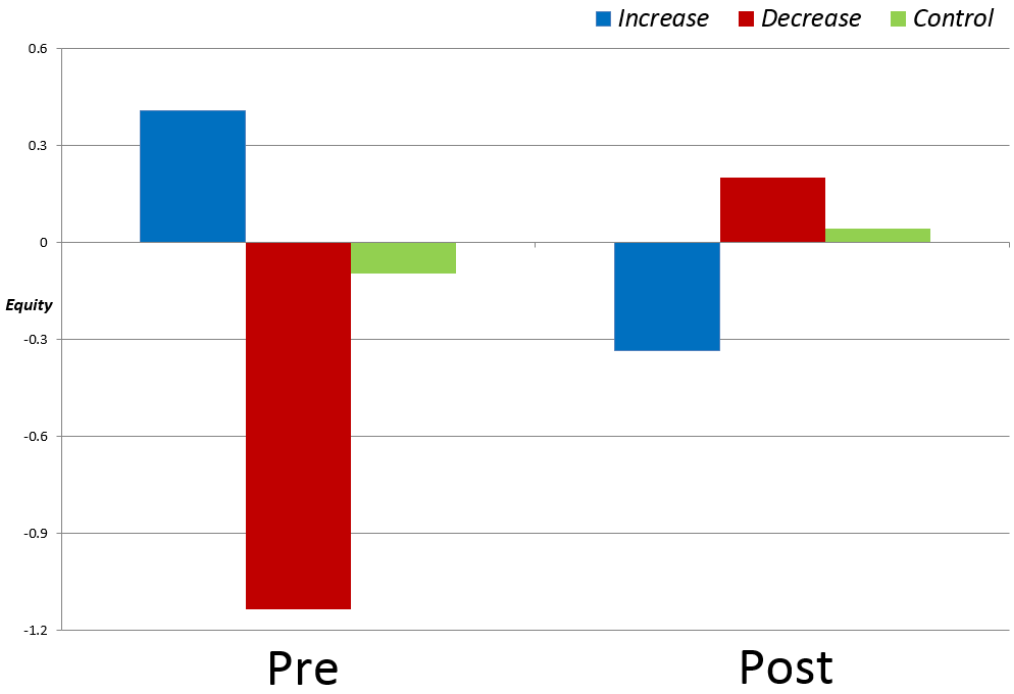
The dependent variable in the first two specifications is bank risk-taking (*Risk taking*) defined as (the log of) capital plus ROA scaled by standard deviation of five annual ROAs; while that in the next two specifications is the cost of bank debt (*Cost of debt*) defined as interest expense divided by total liabilities. The dependent variable in the last two specifications denotes loan portfolio risk (*Non performing loans*) defined as the percentage of non-performing-loans to total loans. *HighIncent* (*LowIncent*) denotes countries that have high (low) risk-shifting incentives due to the presence of government safety nets. *Lend* is defined as the ratio of interest revenue to total revenue and captures lending-based versus fee-based banks. *Increase* denotes countries that increase creditor rights while the *Post* indicator indicates the post-passage period. All other variables are as defined in Table 3. All explanatory variables have been lagged by a year. All regressions include bank fixed effects, country-year fixed effects and robust standard errors clustered by country (reported under the coefficients in parentheses). ***, ** and * denote significance at the 1%, 5% and 10% levels respectively.

	Risk taking		*Cost of debt*		*Non performing loans*	
	High Incent	*Low Incent*	*High Incent*	*Low Incent*	*High Incent*	*Low Incent*
	(1)	(2)	(3)	(4)	(5)	(6)
Lend	-.061	-.166	.132	-.284	.322	1.550
	(.069)	(.160)	(.307)	(.701)	(1.483)	(2.154)
*Treat*Lend*	-.085	.0004	.069	-.751	-.489	.122
	(.441)	(.158)	(.349)	(.951)	(2.676)	(3.060)
*Post*Lend*	.298***	.117	.169	.472	.823	-1.563
	(.095)	(.158)	(.212)	(.786)	(2.050)	(2.334)
*Increase*Post*Lend*	-1.023***	-.058	.764***	-.949	5.585**	-5.717
	(.196)	(.336)	(.237)	(.956)	(2.311)	(3.769)
MM funding	.0009	.002	.007*	-.002	-.004	-.016
	(.001)	(.002)	(.004)	(.008)	(.012)	(.010)
Subordinated debt	-.003	.002	.010***	.006	-.013	.028***
	(.002)	(.003)	(.002)	(.006)	(.037)	(.011)
Log assets	-.043	.046	-.044	-.114	-.286	-1.409
	(.045)	(.048)	(.134)	(.163)	(.577)	(1.104)
Revenue change	.0003	-.00003	.009***	.006***	.003	.004
	(.0002)	(.0003)	(.001)	(.001)	(.002)	(.004)
ROE	.004**	.003	-.007***	-.016***	-.044***	-.050**
	(.002)	(.002)	(.002)	(.003)	(.015)	(.022)
LLP	-.002***	-.002**	.0008	-.0007	.020***	.021**
	(.0003)	(.0008)	(.0008)	(.001)	(.006)	(.008)
Market share	.00006	-.007	.017	.022	.049	.088
	(.010)	(.017)	(.025)	(.021)	(.063)	(.134)
p. val. of diff.	0.011		0.074		0.011	
Bank effects	Y	Y	Y	Y	Y	Y
Cy-year effects	Y	Y	Y	Y	Y	Y
Year effects	N	N	N	N	N	N
Country effects	N	N	N	N	N	N
Obs.	41557	14162	41557	14162	10108	8560
Adj. R^2	.737	.749	.913	.905	.874	.841

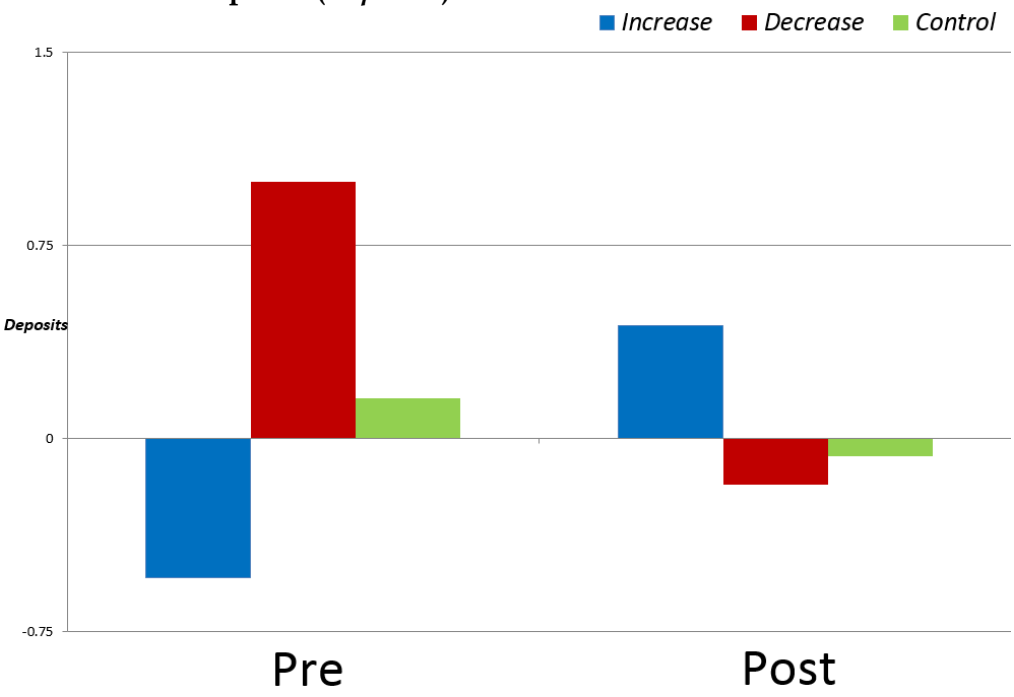
Figure 1: Legal reforms and shifts in bank capital structure

The x-axis denotes the pre and post periods relative to the year of legal reforms. Countries that increased (decreased) creditor rights are denoted by *Increase* (*Decrease*). For countries that did not pass legal reforms (*Control*), the pre and post periods are defined relative to 1999. The y-axis plots mean equity (*Equity*) in Panel A and deposits (*Deposits*) in Panel B orthogonalized w.r.t. controls and country fixed effects.

Panel A: Bank equity (*Equity*)



Panel B: Bank deposits (*Deposits*)



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