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How do laws and institutions affect recovery rates on collateral?

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How Do Laws and Institutions Affect Recovery Rates on Collateral?*

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Abstract

We show that laws and institutions that grant creditors stronger enforcement rights and bargaining power upon default increase expected recovery rates on collateral. Using unique data that provides ex-ante appraised liquidation values on secured loans for a single global bank, we estimate within-borrower effects of enforcement law on expected recovery rates. We show that movable collateral, which is less redeployable, susceptible to agency problems, and faster to depreciate, exhibits lower expected recovery rates that are more vulnerable to enforcement. Further, the bank compensates for lower expected recovery rates through higher interest rates. The results highlight that a lender's expected recovery rate is a first-stage mechanism through which stronger enforcement law affects loan-to-value ratios, lending decisions, and real outcomes.

JEL-Codes: K4; G2; G33

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1. Introduction

A vast literature shows that laws and legal institutions explain international differences in financial development (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1997, 1998, 2000; henceforth LLSV). In particular, debt enforcement laws that improve creditor protection allow lenders to enforce debt contracts in a predictable manner, either in court or through foreclosure proceedings, which in turn affects the lending practices of financial institutions. Further, there is extensive macro- and micro-level evidence that law and institutions governing enforcement affect firm borrowing, investment, and economic growth.[1]

There is, however, little empirical evidence on the underlying mechanisms through which laws and institutions affect lending. In this paper, we provide evidence on the importance of one mechanism – the impact that debt enforcement has on the expected recovery rate that creditors assign to collateral pledging a secured loan. We define the expected recovery rate as the ratio of the bank's appraised liquidation value to the fair market value of the asset pledged as collateral. The expected recovery rate directly affects lending decisions by informing loan-to-value ratios and debt capacity, which in turn is expected to affect firm and economy-wide outcomes.

There are at least two channels that describe how debt enforcement procedures can affect expected recovery rates on collateral. First, weak enforcement of contracts may restrict a creditor's ability to enforce their security, restrict secured creditors from seizing and selling their collateral, increase times to seize assets and grant control to management in reorganization decisions. In response, creditors reduce expected liquidation values on collateral. Second, debtors have greater incentives to strategically default when weak debt enforcement allows them to renegotiate a greater share of reorganization proceeds. This is especially true when the pledged asset has a lower intrinsic expected recovery rate as is the case with movable assets that are prone to agency problems, depreciate faster, and are less redeployable.[2] The second channel implies that, in anticipation of borrower strategic

[1] See, among others, Boot, Aivazian, Demirgüç-Kunt and Maksimovic (2001), Giannetti (2003); Qian and Strahan (2007), Haselmann, Pistor, and Vig (2010); Cerqueiro, Ongena, and Roszbach (2016); and Calomiris, Larrain, Liberti and Sturgess (2017).

[2] Movable assets, as opposed to immovable assets, consist of all non–real estate assets (such as machinery, account receivables, and inventory). We define movable assets according to Chapter 9 of the Uniform Commercial Code (UCC). Liberti and Mian (2009) and Calomiris, Larrain, Liberti and Sturgess (2017) classify assets in a similar way.

behavior, lenders may require collateral with higher intrinsic expected recovery rates so as to reduce debtors' incentives to strategically default or, given the (limited) type of collateral available, reduce the liquidation value on collateral and increase the interest rate spread charged to borrowers.

We explore how the sophistication of a country's debt enforcement affects lender's expected recovery rates on collateral using a novel cross-country micro-level data set containing secured loans for all small and medium businesses issued by an anonymous global bank (henceforth GlobalBank) in 16 emerging market countries. There are several advantages of using this data set. First, using only one bank is beneficial as the secured loans offered are the same across all countries. Since the approval processes of the secured loans are similar across countries, we ensure that differences in the internal organization of lending within GlobalBank do not contaminate our estimations. The second advantage is that it provides information on both the type of asset being pledged as collateral and two separate liquidation values for the asset. The first is the fair market value (FMV) or replacement market value of the collateral being pledged for a particular loan. Importantly, the FMV is independent of the expected costs of debt enforcement. The second value is the orderly liquidation value (OLV). OLV is equal to the FMV minus the bank's expected costs of repossessing and liquidating the pledged assets given the country's institutional framework and efficiency of enforcement. This allows us to construct comparable expected recovery rates (Recovery Rates) as the ratio of OLV-to-FMV (OLV/FMV) for each asset pledged as collateral, which measures the liquidation value per $1 market value of collateral pledged. Importantly, constructing expected recovery rates is something that the previous literature has been unable to do, due to the lack of data on expected asset liquidation values.

We start by presenting empirical evidence on the positive relation between a lender's expected Recovery Rate on collateral and the commonly employed loan-to-value (LTV) ratios to emphasize the importance of expected recovery rates for lending outcomes. This link has been ignored in both the law and finance literature and bankruptcy law literature, mostly due to a lack of data. The correlation between LTV and the expected Recovery Rate is positive and statistically significant, suggesting that, in effect, expected recovery rates are an important channel through which better contract enforcement translates into larger LTV ratios and higher debt capacity.

Next, we examine how cross-country variation in debt enforcement affects the use of collateral and expected Recovery Rates used in the bank's lending decision. We measure cross-country differences in debt enforcement using the creditor rights index developed by LLSV and updated in Djankov, McLiesh, and Shleifer (2007) to focus on the ability of a creditors to maintain control in reorganizations.[3] We show that Recovery Rates are approximately 17% lower in countries with weak debt enforcement than in countries with strong enforcement, defined to be those countries with creditor rights equal to 3 or 4. To better understand the source of this variation, and ensure that country differences are not simply due to specific country variation in collateral composition, we condition our analysis on collateral type. We classify collateral as movable or immovable, as is standard in the collateral law literature. On average, Recovery Rates for movable assets are lower than Recovery Rates for immovable assets, consistent with movable assets having higher intrinsic liquidation costs. However, movable assets are less frequently pledged as collateral in countries with weak debt enforcement. Further, movable assets are more likely to be bundled with immovable assets when pledged in countries with weak debt enforcement. Therefore, it is unlikely that lower Recovery Rates in weak enforcement countries can be explained by collateral composition. Combined, these results suggest that banks prefer to accept immovable rather than movable assets as collateral in weak enforcement countries, consistent with the bank acting to mitigate strategic default concerns.

To understand how the strength of debt enforcement affects the use of collateral and the expected Recovery Rates further, we examine how the within-country spread in Recovery Rates between movable and immovable collateral varies with debt enforcement law. Examining the spread in Recovery Rates directly tests how enforcement law affects the expected costs of liquidation and strategic default on movable assets compared with immovable asserts, and is motivated by the three observations that Recovery Rates are lower for movable assets than immovable assets in all countries, but that Recovery Rates for movable assets are higher in countries with stronger debt enforcement laws, while Recovery Rates for immovable assets are similar across

[3] The index is the sum of four variables that capture the relative power of secured creditors in reorganizations: (1) the requirement of creditor consent when a debtor files for reorganization (*Reorganization Restrictions*), (2) the ability of a creditor to seize collateral once a petition for reorganization is approved (*No Automatic Stay*), (3) whether secured creditors are paid first in liquidation (*Secured Creditors First*), and (4) whether the incumbent management does not retain control of the firm during reorganization (*Management Doesn't Say*). The index ranges between 0 and 4, with higher values indicating higher creditor rights.

countries. Estimating the effect of enforcement law on Recovery Rates in a difference-in-differences framework absorbs omitted country effects and imposes the identification assumption that other country characteristics affect *Recovery Rate* of movable and immovable collateral equally. According to our difference-in-differences estimation that controls for country-industry-time fixed effects and borrower characteristics, Recovery Rates of movable assets are on average 32.0 percentage points higher, relative to Recovery Rates of immovable assets, in strong-law countries relative to weak-law countries.

One concern in interpreting our results is the influence of omitted country factors on the composition of the borrower pool that might affect the distribution of collateral supply and liquidation values within a country. To mitigate this concern, we re-estimate the effect of the law on recovery rates within the same borrower. Using this approach, the difference-in-differences estimate of Recovery Rates between immovable and movable collateral across debt enforcement strength is larger, suggesting that ignoring variation due to borrower composition underestimates the true effect.

We also examine how expected Recovery Rates on collateral interact with credit spreads within the same borrower. We show that credit spreads are, on average, higher in countries with weak debt enforcement and on loans collateralized with movable assets. In a within borrower difference-in-differences estimation, we show that credit spreads are negatively related to expected Recovery Rates, consistent with collateral lowering the cost of borrowing. Further, after controlling for Recovery Rates, we find that debt enforcement has no effect on interest rate spreads. Combined with the earlier results, this indicates that cross-country effects of enforcement on loan contracting and access to credit function through the lender's expected recovery rate.

In summary, our main analysis examining how asset composition, recovery rates, and interest rates vary by asset type across enforcement strength, provides evidence that strategic default concerns inform expected recovery rates and therefore lending decisions. The composition of collateral in weak versus strong debt enforcement countries is tilted toward immovable assets with higher intrinsic liquidation values, consistent with lenders demanding better quality collateral in response to greater concerns of strategic default. Despite this shift in collateral composition towards better quality assets in weak enforcement countries, recovery rates of movable

assets are higher, relative to recovery rates of immovable assets, in strong-law countries relative to weak-law countries, consistent with both greater strategic default concerns and higher liquidation costs in weak-law countries. Further, interest rates are higher on loans secured with poorer quality collateral in countries with weak debt enforcement.

To better understand the effect of debt enforcement on Recovery Rates, we introduce the debt enforcement procedures outlined in Djankov, Hart, McLiesh, and Shleifer (2008; henceforth DHMS), collateral enforcement law, and information sharing. DHMS set the landscape of how debt enforcement varies at the institutional level by studying, in a survey, the role that laws and institutions play in the efficiency of debt enforcement using measures of direct enforcement costs, the way of disposing assets (i.e., preservation as a "going concern" versus "piecemeal sale"), and time to enforcement. We find further support that strategic default concerns influence recovery rates. The negative spread between movable and immovable asset recovery rates is lower when laws protect creditors, including those that allow creditors to take control through foreclosure, enforce claims out of court, and screen and monitor borrowers through information sharing. Further, results are robust to including laws that might otherwise explain the negative spread between movable and immovable asset recovery rates, including the ability to enforce movable collateral and the average time to resolve enforcement.

Finally, we provide evidence on the usefulness of the expected recovery rates by comparing them to the ex-post realized recovery rates on collateral for loans that defaulted and the bank enforced. We show a positive relation between the expected and realized recovery rates on assets at the country level loan portfolio, which suggests that the bank finds the expected measures useful in terms of assessing actual recoveries in the future.

Our paper makes three important and novel contributions. First, we are the first to employ the ex-ante liquidation values and expected recovery rates on collateral used by lenders. Despite the rich theoretical literature on the importance of liquidation values for debt capacity, there is scant empirical evidence on the ex-ante assignment of liquidation values. Prior analyses employ proxies for the liquidation value or ex-post liquidation

values, which are observed only for those borrowers that actually default.[4] Second, we stress that there are two channels through which debt enforcement affects recovery rates. The direct *recovery channel* effect describes the costs of recovering assets when debt enforcement is weak. The indirect *strategic default* channel describes the effect of lenders adjusting recovery rates downwards and credit spreads upwards in anticipation of weak debt enforcement increasing borrower incentives to default. Third, we highlight that expected recovery rates are an underlying mechanism that link law and institutions to lending outcomes. LTVs and thus debt capacity closely follow expected recovery rates on collateral, which we show in turn are largely influence by debt enforcement law.

The analysis in our paper is complementary to that of Calomiris, Larrain, Liberti, and Sturgess (2017) who show that the LTVs of loans collateralized with movable assets made by the same bank are lower in countries with weak collateral laws. These authors show that debt capacity is greater in economies with stronger collateral laws, but they are silent about the underlying mechanisms behind this association. Our paper identifies one of the driving mechanisms, namely the lenders greater expected recovery rates on collateral. Other potential mechanisms driving this association include the direct impact of creditor rights on borrowers' probability of default. We hold this mechanism constant by exploiting within-borrower variation. Hence, similar to DHMS, our focus is on the efficiency of debt enforcement and its impact on lenders' recovery rates, holding other related channels constant.

The paper contributes to the empirical literature relating law and finance with the usage of collateral. This literature shows that laws and institutions explain international differences in financial development and particularly creditor rights (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1997, 1998, 2000). Our paper contributes in the understanding of the mechanism through which lawsa and instituions affect lending, debt capacity of firms, and, ultimately, economy-wide outcomes.

[4] Reindl, Stoughton, and Zechner (2013) show that the selection bias using ex-post liquidation values underestimates bankruptcy costs.

We also contribute to the empirical literature examining financial arrangements when contracting is incomplete. In particular, a few studies show that proxies for higher liquidation values on assets pledged as collateral are associated with longer debt maturity, lower interest spreads, and higher credit ratings. Benmelech Garmaise, and Moskowitz (2005) find that more redeployable properties, based on commercial zoning regulation, receive larger loans with longer maturities, and lower interest rates. Benmelech (2009) studies how specificity of track gauges on US railroads in the US affect debt structure. Bergman and Benmelech (2009) study US airlines and show that loans for more redeployable airplanes have higher loan-to-values. Chaney, Sraer and Thesmar (2011) show that investment is sensitive to collateral value by examining real estate owned by US firms pledged as collateral. Similarly, One et al. (2015) estimate the liquidation value of real estate collateral using a hedonic model of land prices. By observing liquidation values directly, we are able to shed light on the specific laws and institutions that enhance the use collateral to enhance debt capacity.

We finally contribute to the literature on strategic default affecting debt and equity prices. Davydenko and Strebulaev (2007) show that the threat of strategic default lowers corporate debt values. Favara, Schroth and Valta (2012) study the relations between equity beta and return volatility with bankruptcy codes across countries. In general, they find that this relation is lower in countries where the bankruptcy code favor debt renegotiations. We contribute to this literature by providing evidence on an indirect strategic default effect of debt enforcement on assets pledged as collateral on secured lending transactions. We provide support of strategic default on lending decisions through expected recovery rates.

The remainder of the paper is organized as follows. In Section 2 we describe the data. In Section 3 we discuss our empirical strategy. In Section 4 we present our main findings on how laws and institutions impact expected recovery rates on collateral. In Section 5, we explore whether higher expected recovery rates map into lower loan interest rates. In Section 6, we examine alternate enforcement laws. In Section 7, we provide evidence on expected recovery rates and realized recoveries. Our conclusions follow in Section 8.

2. Data Description

Our data comes primarily from three sources: the small and medium-sized enterprise (SME) lending division of a large global bank; law and finance literature focused on debt enforcement including La Porta et al. (1997, 1998, and 2000), Djankov et al. (2007), and Djankov et al. (2008); and the World Bank's Doing Business index (including components of those data that are not publicly available).

GlobalBank provided data on secured loans it made to small and medium-sized enterprises (SMEs) during the years 2002–2004 in 16 emerging market countries. We have access to all the asset-backed programs that GlobalBank developed in emerging markets during the early 2000s as part of an "embedded bank" strategy. One of the main goals of this strategy was for GlobalBank to act as a local bank in order to compete with other local banks in these regions. The asset-backed program includes loans that are collateralized by one or a combination of movables (equipment, machinery, inventory and accounts receivable) and immovables, which comprise real estate assets and financial assets (cash, guarantees, and letters of credit).

The data in our analysis expand the original data used in Liberti and Mian (2010) and Calomiris, Larrain, Liberti and Sturgess (2017) by including measures of the orderly liquidation value of assets pledged as collateral and the interest rate for each loan, which were unavailable to both of these studies. The new data allows us to observe two separate liquidation values for each asset, both determined by external independent accredited appraisers at loan origination. The first liquidation value is the fair market value (FMV) or replacement market value of the collateral being pledged for a particular loan.[5] This is the gross price, expressed in terms of money, that a willing and informed buyer would be expected to pay to a willing and informed seller when neither is under pressure to conclude the transaction. Importantly, this fair market value is independent of both the expected costs

[5] The definition of fair market value includes assets in continued use and installed, as well as those that need to be removed. In the case of assets in continued use or installed, the FMV includes all direct and indirect costs of installation and assembly to make the assets fully operational. In the case of removal of the asset, the FMV includes the cost of removal of the asset to another location. The American Society of Appraisers defines fair market value as follows: "the estimated amount, expressed in terms of money, that may reasonably be expected for a property in an exchange between a willing buyer and a willing seller, with equity to both, neither under any compulsion to buy or sell, and both fully aware of all relevant facts, as of a specific date."

of debt enforcement and a discount due to asset fire sales or the presence of constrained buyers, as in Shleifer and Vishny (1992).

The second liquidation value is the orderly liquidation value (OLV). It is equal to the FMV minus the bank's expected costs of repossessing and liquidating the pledged assets given the country's institutional framework and efficiency of enforcement. The OLV is an estimate of the gross amount that the asset would fetch in an auction-style liquidation allowing for a reasonable period of time (typically no more than 180 days) to identify all potential buyers. The ability to seize the asset, the time to repossess the asset and the expected resale value in a secondary market conditional on getting the asset back are part of the dimensions contained in this measure. The OLV will reflect these conditions by reducing the value of the asset directly. In other words, OLV represents the bank's expected liquidation value of the asset under normal market conditions—not under fire-sale or forced-sale conditions.[6]

With regard to the appraisal process for FMVs and OLVs, the external appraisers use a market value approach to estimate the price the asset could be sold for in the market under different conditions. This is the standard approach used in secure-based lending since it focuses on the liquidation value of the asset, rather than using the cost-based approach, which uses the reproduction or replacement cost of the asset. The market approach is based on historical auction sale transactions of similar assets.[7] Both the FMV and OLV are appraised at loan origination, and hence are *expected* liquidation values.

We combine the FMV and OLV to construct expected recovery rates (*Recovery Rate*) on collateral as the ratio OLV/FMV. The *Recovery Rate* measures the liquidation value per $1 market value of collateral pledged. By construction, the ratio absorbs all valuation features common to FMV and OLV within an asset pledged by a firm. Hence, *Recovery Rate* provides a unique real-world estimate of the expected loss in collateral values when

[6] The American Society of Appraisers defines orderly liquidation value as "the estimated gross amount, expressed in terms of money, that could be typically realized from a liquidation sale, given a reasonable period of time to find a purchaser (or purchasers), with the seller being compelled to sell on an as-is, where-is basis, as of a specific date."

[7] A third method, the income approach, is based on discounting future cash flows of the assets. This approach is seldom used in practice since it assumes that a particular cash flow stream can be matched to a particular asset.

enforcing a security interest. Table A1 in the appendix provides summary statistics for the *Recovery Rate* and key variables used in the analysis from GlobalBank. For each borrowing firm, we observe the loan origination, the industry they are operating in, their size and internal risk rating as determined by the bank, and key balance sheet characteristics. For every loan origination, we observe the outstanding loan amount and interest rate spread as well as the liquidation values and type of each collateral ("asset class") securing each loan.

Our main regression analysis examines *Recovery Rates* on collateral within-country and within-borrower. In our cross-sectional within-country tests, our sample includes 10,146 firm-asset observations for 7,422 firms in our sample of 16 countries.[8] For our cross-sectional within-firm tests in which we compare *Recovery Rates* across asset types within the same firm, our sample includes 4,744 firm-asset observations pledged by 2,002 firms. Table 1 provides an overview of our sample. For each country, we report the number of observations in our empirical analysis, the number of unique firms, and enforcement characteristics.

(Insert Table 1 about here)

To measure differences across countries in strength of enforcement laws, we examine two main dimensions of creditor rights: "rules in the books" and efficiency of enforcement in practice. As a benchmark indicator of "rules in the books," we use the creditor rights index taken from Djankov, McLiesh, and Shleifer (2007).[9] The index is the sum of four variables that capture the relative power of secured creditors in bankruptcy proceedings: (1) the requirement of creditor consent when a debtor files for reorganization (*Reorganization Restrictions*), (2) the ability of a creditor to seize collateral once a petition for reorganization is approved (*No Automatic Stay*), (3) whether secured creditors are paid first in liquidation (*Secured Creditors First*), and (4) whether the incumbent management does not retain control of the firm during reorganization (*Management*

[8] Our original dataset has 12,591 unique firms. However, we can only make use of a sample of 7,422 unique firms. We lose 766 firms that were already in default at the beginning of the sample period. These firms are not actively borrowing during the sample period. We also lose 1,406 firms that do not draw any loan from the bank during our sample period. We also lose 2,997 firms for which we lack data for some of our key variables, such as collateral and firm characteristics.

[9] DMS updated and extended the LLSV index for a larger set of countries than those covered in LLSV.

Doesn't Stay). The index ranges between 0 and 4, with higher values indicating higher creditor rights. In the analysis, we use both the LLSV index and its individual components.

As alternative measure of rules in the books, we also use the strength of collateral law index taken from the World Bank's 2005 Doing Business Survey (DB). The eight features of the index cover three aspects of the movable collateral law: Collateral Creation, Collateral Registry, and Collateral Enforcement. Creation measures the legal scope of movable assets to be pledged as collateral: monitoring measures whether creditors can ensure that other lenders do not have security rights over the same assets, and enforcement measures whether the law allows parties to contractually agree to out-of-court enforcement for movable collateral.[10]

To capture the efficiency of enforcement in practice, we employ three indicators: Rule of Law, Contract Days, and Enforcement Procedure. The Rule of Law index is a survey-based assessment by investors in different countries of the law and order environment they operate in, taken from LLSV. The index takes values from 0 to 10, with lower scores indicating less tradition for law and order. Contract Days is an indicator of the efficiency of the judicial system measuring the number of days it takes to resolve a payment dispute through the court system taken from Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2003; hereafter DLLS). Enforcement Procedure is a survey-based indicator developed by DHMS. It indicates which procedure (foreclosure, reorganization, or liquidation) is more likely to be used according to insolvency practitioners to recover a security interest in a hypothetical case of an insolvent firm given the country's laws and institutions.[11]

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[10] Construction of the index follows Calomiris et al. (2017). The movable collateral law (*MC Law*) index they use includes the following seven categories: (1) the law allows for non-possessory security interests over movable assets, without requiring a specific description of the collateral; (2) the law allows a business to grant a non-possessory security right in substantially all its movable assets, without requiring a specific description of the collateral; (3) a security right may be given over future or after-acquired movable assets and may extend automatically to the products, proceeds, or replacements of the original assets; (4) a general description of debts and obligations is permitted in the collateral agreement and in registration documents; all types of debts and obligations can be secured between the parties, and the collateral agreement can include a maximum amount for which the assets are encumbered; (5) secured creditors are paid first (e.g., before tax claims and employee claims) when the debtor defaults outside an insolvency procedure; (6) a collateral registry or registration institution for security interests over movable property is in operation; (7) the law allows parties to agree in a movable collateral agreement that the lender may enforce its security right out of court. *Collateral Creation* is determined by adding one for each one of the first five components, and creating a dummy variable equal to one if the sum is above the median sum across countries and zero otherwise. *Collateral Registry* and *Collateral Enforcement* are equal to one if the sixth and seventh components are equal to one, and zero otherwise.

[11] The DHMS countries cover all but two of our countries, India and Pakistan. In our main tests focusing on procedures from DHMS, we classify these as the default procedure. Results are robust to dropping these two countries. In addition, DHMS

Table 1 reveals that there is a great deal of heterogeneity with respect to creditor rights in our sample. For example, 6 of the 16 sample countries are classified as high creditor rights index (HCR where the index takes a value of 3 or 4), while the remaining 10 countries are classified as low creditor rights (LCR). In terms of observations, 54 percent of originations are from HCR countries. There is also substantial variation with respect to the individual components of the LLSV index—with the exception of *Secured Creditors First*,which features in 75 percent of the countries in our sample. The strength of the collateral law index also varies significantly across the sample, with some countries having very high values (8 out of 8) and others having very low values (2 out of 8). Going beyond "rules in the books," we also observe substantial variation in the quality of law enforcement. Twenty-five percent of the sample countries have poor Rule of Law scores of 5 or below, while another 25 percent have high scores of 8 or higher. There is also substantial variation in Contract Days, with Singapore and Brazil at the two extremes of the spectrum. Similarly, each of the three enforcement procedures is equally represented in the sample.

3. Empirical Strategy

We estimate the effect of enforcement law strength on *Recovery Rate* of movable assets relative to immovable assets. To do so, we exploit two sources of variation: variation in enforcement law strength across countries and within-country, and later within-firm, variation across collateral types. In particular, we compare the difference between *Recovery Rate* on movable and immovable collateral in countries with strong relative to weak enforcement laws. Our identification assumption is that other country characteristics affect *Recovery Rate* of movable and immovable collateral equally.

We begin by estimating the following model:

$$Recovery\ Rate_{k,i,c,t} = \alpha_c + \alpha_t + \alpha_j + \beta_1 Movable_k + \beta_2 Movable_k \times Creditor\ Rights_c + \gamma_1 Firm_{i,t} + \varepsilon_{k,i,c,t}. \quad (1)$$

collected and studied several other characteristics of a country's bankruptcy law with the goal of understanding which features of the law may be more conducive to an efficient enforcement from the secured creditors' perspective. We abstain from investigating individual characteristics of the bankruptcy law used in DHMS because we do not always have sufficient variation in our sample.

where *Recovery Rate*$_{k,i,c,t}$ denotes the bank's expected recovery rate on asset class k securing a loan to borrower i in country c, originated at time t. α_c, α_t, and α_j denote country, time, and industry fixed effects, respectively. *Movable*$_k$ is a (0, 1) dummy variable indicating whether collateral k is movable or not. *Creditor Rights*$_c$ is a dummy variable equal to 1 in HCR economies and zero otherwise, which is our benchmark measure of enforcement. *Firm*$_{i,t}$ is a vector of time-varying firm characteristics at t. $\varepsilon_{k,i,c,t}$ is the idiosyncratic error term.

The coefficients of interest are β_1 and β_2. The coefficient β_1 measures the average difference in *Recovery Rates* between movable and immovable collateral in LCR countries. β_2 measures the difference in *Recovery Rates* between movable and immovable collateral in strong creditor rights countries, relative to weak-creditor-rights countries. We expect β_1 to be negative, but we expect this spread to be dampened by laws that protect creditors, and thus β_2 should be positive.

An obvious concern in estimating (1) is that there could be an omitted variables problem: country characteristics correlated with enforcement law could affect *Recovery Rates* of movable and immovable collateral differentially. To address this concern, we allow for omitted country characteristics to affect movable and immovable collateral differently. We include each country's economic development, measured as the GDP per capita, and also interact this with collateral type. While GDP per capita correlates with factors we aim to study (i.e., richer countries have stronger creditor rights), it also correlates with many other country characteristics that may affect liquidation values on pledged assets—institutional or not. Introducing an interaction between movable collateral and GDP per capita allows us to study whether such factors affect movable and immovable collateral differently.

A second concern is that it is possible that omitted factors *within* a country threaten the internal validity of our estimates—that is, borrowers that pledge movable and immovable collateral within the same country may differ in some unobservable way that explains differences in liquidation values. To address the second concern, we exploit the within-borrower variation across different types of collateral. This allows us to estimate the difference in liquidation values across collateral types for the same borrower and then contrast how this within-borrower difference varies across creditor rights by employing a borrower-fixed effects (α_i) framework:

$$Recovery\ Rate_{k,i,c,t} = \alpha_i + \alpha_t + \beta_1 Movable_k + \beta_2 Movable_k \times Creditor\ Rights_c + \gamma_1 Firm_{i,t} + \varepsilon_{k,i,c,t}. \quad (2)$$

4. Debt enforcement and GlobalBank's secured lending

In this section, we analyze how differences in debt enforcement across countries affects both the valuation and type of collateral employed in GlobalBank loans for 16 emerging market countries.

4.1. Recovery rates and loan-to-value ratios

We start by examining how the expected recovery rate on collateral in each country. In Figure 1 we provide descriptive statistics for the average *Recovery Rate* at the country level plotted against creditor rights. The slope of this relation is positive and significant. A country-level regression of *Recovery Rate* on the creditor right index yields a coefficient of 0.097, which is statistically significant at the 5%-level. Further, we can sort countries into two groups: HCR countries and and LCR countries. The average *Recovery Rate* is 91.3% in HCR countries and 74.1% in LCR countries(Table 3). The difference of 17.2 percentage points is statistically significant at the 1%-level, which indicates that GlobalBank assigns lower recovery valuations to assets in countries with weak debt enforcement.

(Insert Figure 1 about here)

To emphasize the importance of the relation between recovery rates and debt enforcement in Figure 1, we present the correlation between LTV ratios and the expected recovery rate in Figure 2.[12] The correlation is positive and statistically significant suggesting that, in effect, expected recovery rates are an important channel through which better contract enforcement translates into lower loan-to-value ratios and higher debt capacity.[13] The figure also highlights that the two measures do not perfectly coincide as loan-to-value ratios are also affected by additional factors such as the direct impact of institutions on default probabilities.

[12] The loan-to-value ratio is the loan value to the FMV of the pledged asset.

[13] In unreported results, we estimate LTV on expected recovery rates at the country-industry level in a country fixed effects specification. The conditional estimate on recovery rates is 0.79 and significant at the 1%-level.

(Insert Figure 2 about here)

4.2. Cross-country analysis on collateral composition

Next, we analyze the relation between debt enforcement and collateral composition. For each of the 16 countries in our sample, we calculate the frequency of movable-backed loans. In Figure 3 we provide descriptive statistics for the average frequency of movable-backed loans at the country level plotted against creditor rights. The slope of this relation is positive and significant. The average frequency of immovable-backed loans is 63% in HCR countries and 43% in LCR countries. The difference of 20 percentage points is statistically significant at the 5% level, which indicates that GlobalBank lends more frequently against movable assets in countries that have strong enforcement laws.

(Insert Figure 3 about here)

In Figure 4, we explore the question of how debt enforcement affects collateral composition further by examining collateral bundling. For each of the 16 countries in our sample, we calculate the frequency of movable-backed loans that are also backed by immovables, that is, the loan is backed by a bundle of movable and immovable collateral. The average frequency of bundle-backed loans is 5% in HCR countries and 17% in LCR countries. The difference of 12 percentage points is statistically significant at the 10% level. Figure 4 indicates that GlobalBank not only lends less against movable assets in countries that have weak enforcement laws, but that when it does lend it is more likely to lend against movable collateral when bundled with immovable collateral.

(Insert Figure 4 about here)

In Table 3, we examine how debt enforcement affects the composition in a regression framework including firm characteristics and industry and time fixed effects. This helps mitigate the selection concern that the collateral compositions presented in Figures 3 and 4 are due to differences in borrower composition. In

columns (1) and (2) we focus on the proportion of loans that are backed with movable collateral.[14] The average frequency of movable-backed loans is 14 percentage points higher in HCR countries, which is significant at the 5% level. In columns (3) and (4), we examine bundling for the 5,426 of 8,695 loans that have at least some movable assets pledged as collateral. In column (4), the average frequency of bundle-backed loans is 16 percentage points lower in HCR countries., which is significant at the 1% level. Combined, Table 2 and Figures 3 and 4 are consistent with the notion that a greater legal ability to enforce debt contracts and recover collateral is associated with a larger collateral menu that in particular allows firms to pledge movable assets.

(Insert Table 2 about here)

4.3. Cross-country analysis on expected recovery rates

In Table 3, we compute the average *Recovery Rates* for each of the two collateral types in each country, as well as the average for HCR and LCR countries. The average *Recovery Rate* for our sample is 0.805, but this varies significantly across immovable and movable assets (0.985 versus 0.631). This indicates that the shift in composition toward immovable collateral in LCR economies is consistent with a shift towards better-quality collateral. Consistent with this notion, *Recovery Rates* on immovable collateral are similar in LCR and HCR (0.983 for LCR countries versus 0.989 for HCR countries). However, *Recovery Rates* on movable assets are very different across LCR and HCR countries (0.741 versus 0.913). Comparing *Recovery Rates* across enforcement law and asset type, we find that the difference in *Recovery Rates* between movable and immovable assets is –24.7 percent in LCR countries compared with HCR countries, consistent with weaker enforcement law being associated with lower liquidation values on movable assets.

(Insert Table 3 about here)

The fact that a difference exists in *Recovery Rates* for movables lending between weak and strong enforcement despite the shift away from movable collateral in weak-enforcement countries indicates that collateral composition may be constrained by supply-side factors. The observed patterns suggest that although

[14] The number of observations is lower than the 10,146 presented in Table 1 because we focus on loan-level observations in Table 3, and some loans are backed with multiple forms of collateral.

lenders may attempt to overcome enforcement frictions by requiring more attractive collateral in LCR countries, their ability to do so is limited and in response they price enforcement costs into expected recovery rates.

To test the effect of debt enforcement on *Recovery Rates*, we estimate the cross-sectional difference-in-differences estimation in specification (1). Table 4 reports the *Recovery Rates* results. In column (1), we compare GlobalBank's expected recovery rates on movable and immovable collateral across all countries. Our estimates suggest that the bank's expected recovery rates on movable collateral are on average 30.2 percentage points lower than on immovable collateral, controlling for country fixed effects, industry effects, and borrower characteristics.

(Insert Table 4 about here)

In column (2), we examine how the recovery rate spread compares across weak and strong creditor rights countries. The spread is substantially more pronounced in weak-creditor-rights countries. Our estimates indicate that the average spread is –44.8 percentage points in weak-creditor-rights countries as opposed to only –11.1 percentage points in countries with strong creditor rights, which is comparable to the univariate estimates in Table 2. The difference between these two values, captured by the interaction term, indicates that expected recovery rates on movable relative to immovable collateral are 30.7 percentage points higher in countries with strong creditor rights, relative to countries with weak creditor rights. This difference-in-differences estimate suggests that creditor rights have a large impact on expected recovery rates, particularly on movable collateral.

Comparisons of the estimates in Table 4 with the univariate difference in differences of 24.7 percent in Table 3 reveals that failing to account for possible confounding factors at the country level tends to underestimate the impact of creditor rights by around 24 percent ((0.307 – 0.247)/0.247). Relative to the average recovery rate on movable collateral in weak-rights countries, reported in Table 2, our difference-in-differences estimate suggests that stronger creditor rights increase expected recovery rates on movable collateral by around 57 percent (0.307/0.537). Similar results are obtained in column (3), where we use country-industry fixed effects.[15]

[15] Table 1 showed that some countries had a substantially larger number of observations than other countries. In unreported regressions, we collapse the number of observations at the country-level, retaining one observation per country. In particular, we first run 16 country-level regressions of equation (1), excluding country-level effects. We then regress the estimated coefficient of *Movable* on a constant, *Creditor Rights and Creditor Rights* × *Movable*. The estimated coefficients of *Movable*

To further examine whether omitted country characteristics threaten the internal validity of our estimates, we also allow for an interaction between movable collateral and GDP per capita. If omitted country characteristics affect movable and immovable collateral differently, our difference-in-differences approach will not completely eliminate biases arising from such factors. To proxy for such characteristics, we use a country's *GDP per Capita* and interact this with *Movable* in column (4). The coefficient of the interaction between *Movable* and *Creditor Rights* remains positive and statistically significant. Its size is somewhat smaller, which is expected given the positive correlation between GDP per capita and creditor rights.[16] The coefficient of the interaction term with GDP per capita is statistically insignificant and close to zero, suggesting that omitted country characteristics are unlikely to affect movable and immovable collateral differently.

The results in columns (1) – (3) likely understate the understate the degree to which recovery rates are affected by enforcement laws for two reasons. First, in the absence of strong enforcement laws, the composition of borrowers is likely to shift toward more seasoned credit risks. Second, as we show above, lenders demand better-quality collateral in response to weak enforcement laws. To help mitigate this downward bias, we examine the effect of enforcement law on recovery rates in a borrower fixed effects framework, which is our main specification in all following tests. The sample size reduces from 10,146 to 4,744 because, as presented in Table 1, only 2,022 borrowers pledge multiple collateral types in 4,744 observations. The results are shown in columns (5) and (6), where we introduce country-industry-time fixed effects to absorb local economic fluctuations that might explain within borrower variation in liquidation values through time Results are qualitatively unchanged, but the magnitude of coefficient on the interaction between *Movable* and *Creditor Right* increases by approximately 10 to 20 percent.

is 0.424***, and the interaction term between *Creditor Rights and Movable* is 0.257**. Similar results hold when we apply weighted least squares with as weight "1/number of observations per country."

[16] The pairwise correlation between GDP per capita and *Creditor Rights* is 0.489 and statistically significant.

5. Debt enforcement laws, expected recovery rates, and interest rates

To understand how debt enforcement affects loan contracting, we examine how expected recovery rates on collateral are reflected in the interest rates charged to borrowers.

We examine how interest rates on loans backed by movable assets vary with enforcement law, relative to loans backed by immovable assets, within borrower to mitigate selection concerns. The sample of borrowers that pledge both collateral types is formed of borrowers that pledge movable and immovable collateral at the same time, against the same loan, and those that pledge movable and immovable collateral against two distinct loans. To study the relation between recovery rates and interest rates, we focus on the second group. We drop instances in which a borrower pledges multiple assets against a single loan because interest rates are observed at the loan level, and therefore we are unable to identify differences in interest rates across collateral types within the same borrower when multiple collateral types support the same loan. This leaves us with 1,350 of the original 4,744 observations.

In Panel A of Table 5 we present descriptive statistics for interest rates. This rate available in our data is the net spread—that is, the gross interest rate charged on the loan minus the marginal cost of lending. Examining differences across collateral types, interest rates are 72.3 basis points higher in LCR countries, which is equivalent to an increase of 10.7% relative to interest rates in HCR countries. Interest rates are, on average, 55.4 basis points higher for loans backed with movable collateral than loans backed with immovable collateral. However, the interest rate spread on movables over immovables is higher in LCR countries (0.837 basis points) than in HCR countries (0.171 basis points). A difference-in-differences comparison of interest rate spreads on movables versus immovable across enforcement law strength shows that rates are 66.6 basis points higher on movable loans than immovable loans in weak-law countries compared with strong-law countries.

(Insert Table 5 about here)

In Panel B of Table 5, we confirm that the expected recovery rates in the subsample of 1,350 observations vary across economies and collateral in the same way as for the full sample, reported in Table 2.

Next, we study interest rates in a cross-sectional difference-in-differences framework with firm fixed effects. In Table 6, we report estimates of interest rate regressions with borrower fixed effects in a framework similar to specification (2). In column (1) we find that interest rates are, on average, 64.3 basis points higher on loans supported with movable collateral than for loans supported with immovable collateral. This comparison is made for the same borrower pledging two loans, controlling for borrower and time fixed effects and changes in loan and borrower characteristics, including GlobalBank's assessment of credit risk, and thus free from unobserved heterogeneity issues that generally plague tests of the empirical relation between collateral and interest rates.

In column (2) we introduce creditor rights. The positive rate spread on movable collateral is 105 basis points in weak-enforcement countries but only 26.4 basis points in strong-enforcement countries (the sum of 1.050 and –0.786 is significant at the 10%-level). In column (3), we examine the relation between interest rates and expected recovery rates directly. We find a negative, statistically and economically significant relation between recovery rates and interest rates. The coefficient on *Recovery Rate* of -0.929 in column (3) implies that a one standard deviation increase in the expected recovery rate of 25 percentage points is associated with an increase of 23 basis points in the interest rate spread.

In column (4), we examine if the relation between recovery rates and interest rates varies by enforcement law strength. The results show that, conditioning on recovery rate, enforcement has no effect on interest rate spreads. Combined with the earlier results, this indicates that cross-country effects of enforcement on loan contracting and access to credit function through the lender's expected recovery rate.

(Insert Table 6 about here)

6. Further evidence on debt enforcement laws and recovery rates

To better understand the facets of debt enforcement law that affect expected recovery rates on movable collateral versus immovable collateral, we examine alternate enforcement laws and institutions that govern creditors' bargaining power and control rights in default, characterized by "rules in the books" and efficiency of enforcement in practice. We focus on the individual components of the creditor right index from LLSV; law on

the use of movable collateral from the World Bank Doing Business index and Calomiris, Larrain, Liberti and Sturgess (2017); survey evidence on the enforcement procedure and efficiency of judgement from Djankov et. al. (2008); and whether a country has a public information registry or private information bureau.[17]

In Table 7, we evaluate the impact of these procedures on Globalbnk's expected recovery rates on movable and immovable collateral using our difference-in-differences approach with borrower fixed effects. In column (1) we focus on the four components of the creditor right index.

We find that the variables *No Automatic Stay*, and *Management Doesn't Stay* both matter for expected recovery rates on movable collateral. Specifically, recovery rates are higher on movable assets for borrowers in countries where there is no automatic stay on the assets of a firm, that might prevent a secured creditor enforcing, or where management doe notstay. Stay and maintain control of assets throughout enforcement. Importantly, since our focus is on how enforcement affects recovery rates on movables versus immovable for the same borrower, the results in column (1) imply that valuations on movable assets are uniquely adversely affected by management maintaining control in enforcement. One potential explanation is that lower recovery rates on movable assets transfers bargaining power to debtors because movable asset values are intrinsically linked to the firm or because management has a greater opportunity to tunnel movable assets than immovable assets.

Next, we explore the role of movable collateral laws, using data from the World Bank's Doing Business legal rights index. Following Calomiris, Larrain, Liberti and Sturgess (2017), we build three indicators that reflect the strength of movable collateral law: Collateral Creation, Collateral Registry, and Collateral Enforcement. We present within estimates in column (2) of Table 7, where we include the three components of movable collateral law in addition to the creditor rights index. Expected recovery rates on movable collateral relative to immovable collateral are substantially higher in countries with stronger movable collateral laws, specifically in relation to collateral enforcement, which is important in explaining recovery rates over and above the more general creditor rights index.[18]

[17] Appendix Table 3 presents pairwise correlations between the alternate enforcement variables.
[18] Pairwise correlations in Appendix Table 3 indicate that countries where the scope of using movable assets as collateral is high also exhibit stronger creditor rights. This indicates that the use of movable collateral increases as the institutional

(Insert Table 7 about here)

In column (3), we examine how expected enforcement procedure affects expected recovery rates. Using a representative insolvency case of a midsize firm, DHMS asked insolvency practitioners in each country to determine which enforcement procedure (foreclosure, liquidation, or attempt for reorganization) is more likely to be used given the country's bankruptcy laws and institutions. Countries where foreclosure, as opposed to reorganization or liquidation, is feasible, exhibit higher expected recovery rates. DMHS found that foreclosure works extremely well when combined with an "out-of-court enforcement", which may be particularly valuable for movable assets if management control is associated with lower recovery rates, as we find above. Again, this underlines that creditors expect higher recover values if they can expect to maintain power in enforcement, which helps alleviate agency problems pertaining to movable assets during enforcement.

Next, we study how the bank's expected recovery rates on movable collateral vary with the quality of its legal system as measured by the number of days that it takes to enforce a payment dispute through the courts (Log Contract Days). The measure is taken from Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2003). Pairwise correlations in Appendix Table A3 indicate that countries with inefficient courts tend to have lower expected recovery rates on collateral, have weaker creditor rights, and are less likely to enable out-of-court enforcement of security interests. Estimates in Table 7 indicate that expected recovery rates on movable collateral relative to immovable collateral are substantially lower in countries where enforcing a contract through the courts takes longer, even after taking into account the strength of debt enforcement. Long enforcement times might adversely affect movable assets, such as inventory, because they exhibit both higher depreciation rates and lower redeployablility than immovable assets such as real estate.

We also explore the role of public credit registries and private credit bureaus. While not an enforcement mechanism, information sharing allows creditors to better screen and monitor borrowers and provides strong incentives against borrower strategic default (see, e.g., Jappelli and Pagano 1993 and Padilla and Pagano 1997,

framework improves, consistent with the main thesis of the paper that movable assets are more susceptible to the inefficiencies induced by a weak institutional framework, and therefore, their use requires a stronger institutional framework.

2000). Estimation results in Table 6 indicate that expected recovery rates on movable collateral relative to immovable collateral are 38.6 percentage points higher when information sharing is present, even controlling for debt enforcement.

In summary, the results indicate that efficient enforcement of contracts, in terms of both procedure and timing, are particularly important in explaining variation in recovery rates on movable assets in addition to creditor rights that protect creditors' bargaining power.

7. Expected recovery rates and realized recoveries

In the final part of the paper, we contrast the bank's expected recovery rate with actual recovery rates from the bank's lending program. Information on actual recovery rates on collateral and actual recovery rates on collateral on loans are available in the data at the aggregate country level.[19] This enables us to gain some additional insights on the credibility of our key explanatory variable and the bank's lending behavior.

To provide further credibility to our analysis, we correlate, at the country level, the actual recovery rates on collateral for loans in our sample with the expected recovery rates on collateral. Figure 5 shows a positive and significant correlation (0.56) between the expected and actual recovery rates on collateral, suggesting that the bank's expected recovery rates are insightful in predicting the actual recovery of the collateral.

(Insert Figure 5 about here)

In Figure 6 we also plot the relation between the expected recovery rates on collateral and the actual recovery rates on loans. If the lender prices weak enforcement into lending decisions through the expected recovery rate on collateral, then lower expected recovery rates should result in lower loan-to-value ratios, as shown in Figure 2, but not necessarily lower recovery rates on loans. We find this is the case. This suggests that banks are able to overcome inefficiencies in the legal and institutional environment through private contracting—admittedly not without consequences to borrowers, consistent with insights from the law and finance literature.

[19] We observe only the final recovery rates on both collateral and loan, but not the details on the loans or the enforcement procedure either at the borrower-level or on aggregate.

(Insert Figure 6 about here)

V. Concluding Remarks

Collateral is central to secured debt contracts. One of the defining characteristics of collateral is the value a creditor expects to recover upon default, which ultimately decides the cost of credit and the borrower's debt capacity. In this paper, we exploit a unique cross-country data set to show that enforcement law and institutions are a primary determinant in explaining liquidation values from the perspective of a creditor.

The average expected recovery rate of collateral across countries and collateral types is about 80.5 percent, implying an inefficiency of 19.5 percent. However, expected recovery rates are lower with weak creditor protection (about 74 percent) compared with strong creditor protection (about 91 percent). We show that variation in expected recovery rates is predominantly driven by the effect of weak enforcement law on liquidation values on movable assets. Examining the within-borrower recovery rate spread, the difference in recovery rate on movable versus immovable collateral for the same borrower, we find that the recovery spread is about –20 percentage points with strong creditor protection and around –45 percentage points with weak creditor protection. Further, we show that the creditor increases interest rates to compensate for lower recovery rates in countries with weak debt enforcement.

Taken together, our results provide empirical evidence consistent with theory on debt contracting when contracts are incomplete. Laws and institutions that bestow stronger enforcement rights to a creditor give creditors significant bargaining power and control over debtors in the event of default. This leads to more efficient enforcement, and hence a smaller discount in liquidation values relative to market values. On the other hand, laws that grant stronger rights to a debtor are associated with lower expected recovery rates.

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Figure 1
Expected Recovery Rates and Creditor Rights: Country-Level Evidence

This figure plots the relationship between a country's creditor rights index and the country average expected recovery rate on collateral. Expected recovery rate on collateral is defined as the ratio of orderly liquidation value (OLV) over the fair market value (FMV) of the asset. The creditor rights index is an index from 1 to 4 aggregating different creditor rights, following La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998). The average is taken during the period 2002–2004.

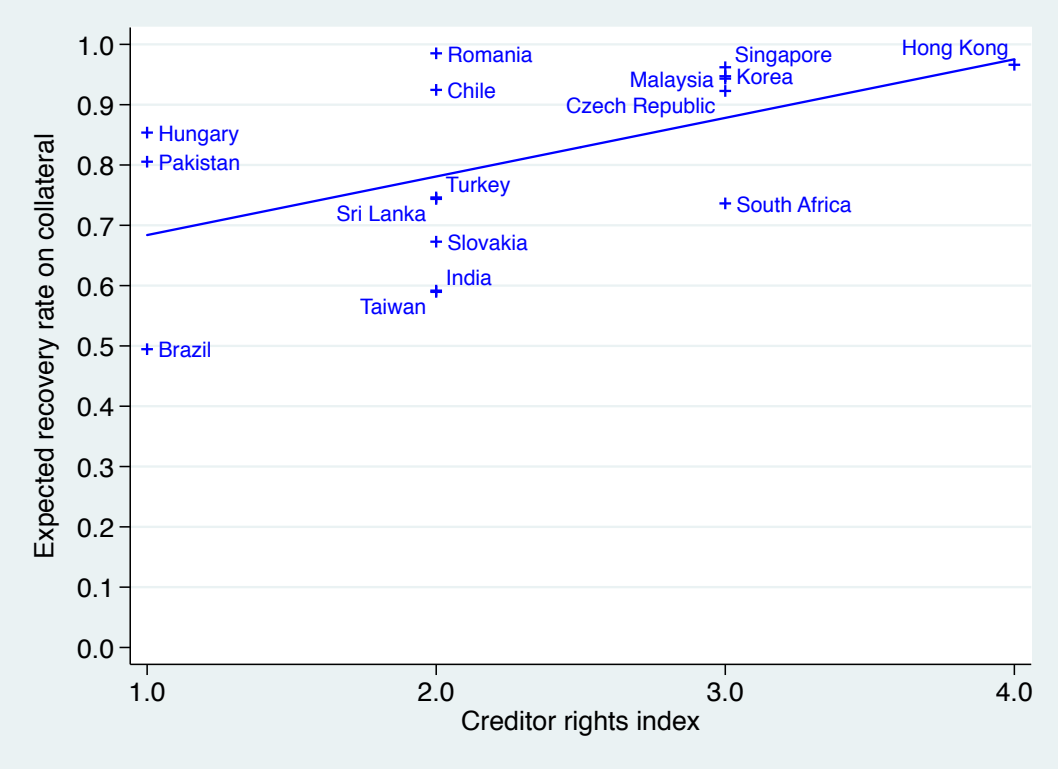

Figure 2
Loan-to-Value and Expected Recovery Rates: Country-Level Evidence

This figure plots the relation between the average expected recovery rate on collateral and the average loan-to-value (LTV) at the industry-country level. The loan-to-value ratio is the amount actually drawn on a line of credit or booked term loans, over the liquidation value of the asset pledged measured by the fair market value. Each observation is the country-industry mean expected recovery rate on collateral or LTV during the period 2002–2004.

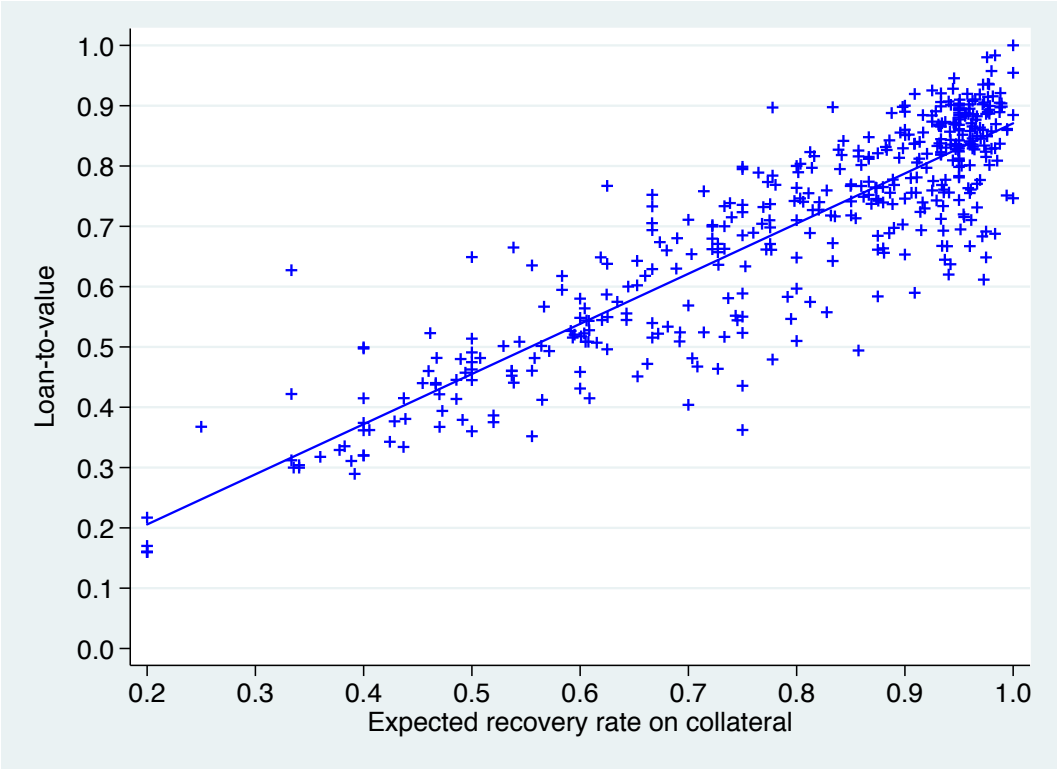

Figure 3
Movable Collateral Composition and Creditor Rights: Country-Level Evidence

This figure plots the relationship between a country's creditor rights index and the fraction of loans secured with movable collateral. Movable collateral includes accounts receivable, equipment & vehicles, and firm-specific assets. The creditor rights index is an index from 1 to 4 aggregating different creditor rights, following La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998). The average is taken during the period 2002–2004.

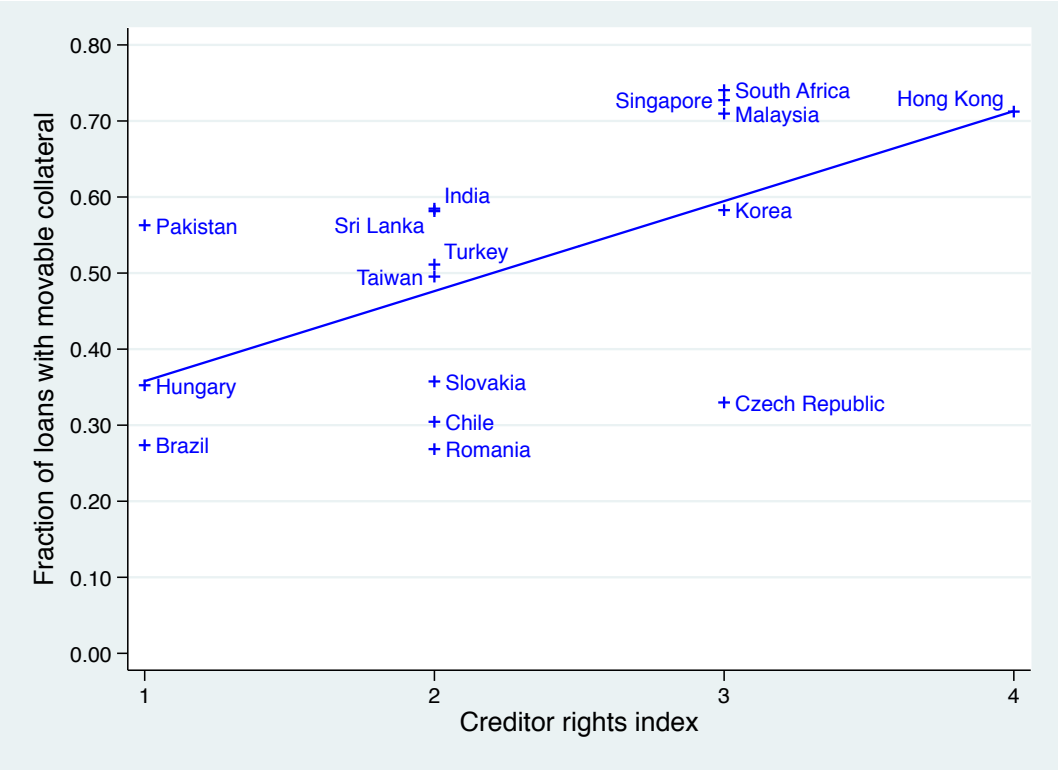

Figure 4
Collateral Bundling and Creditor Rights: Country-Level Evidence

This figure plots the relationship between a country's creditor rights index and the fraction of loans secured with movable collateral that are also secured with immovable collateral (movable collateral is bundled with immovable collateral). Movable collateral includes accounts receivable, equipment & vehicles, and firm-specific assets. Immovable collateral includes land, real estate, and financial assets such as cash, letters of credit, and guarantees. The creditor rights index is an index from 1 to 4 aggregating different creditor rights, following La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998). The average is taken during the period 2002–2004.

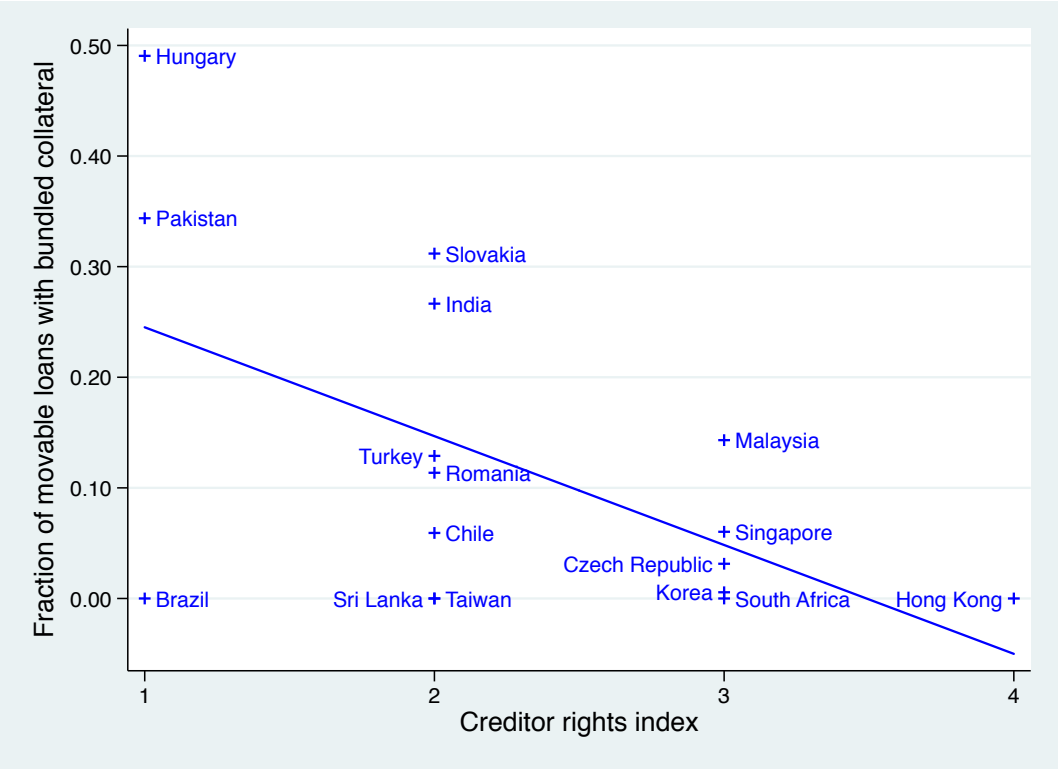

Figure 5
Actual Recovery Rates on Collateral and Expected Recovery Rates on Collateral: Country-Level Evidence

This figure plots the relation between the expected recovery rate on collateral and the actual recovery rate on collateral at the country level. The average is taken during the period 2002–2004. *Actual Recovery Rate on Collateral* is provided by the bank's lending program on an aggregate basis at the country level and represents the actual recovery rate on a dollar of collateral value. *Expected Recovery Rate on Collateral* is the average expected recovery rate on a dollar of collateral value for all borrowers in each country. The number of countries is reduced from 16 to 14 since there are no data available on actual recovery rates on collateral for two countries.

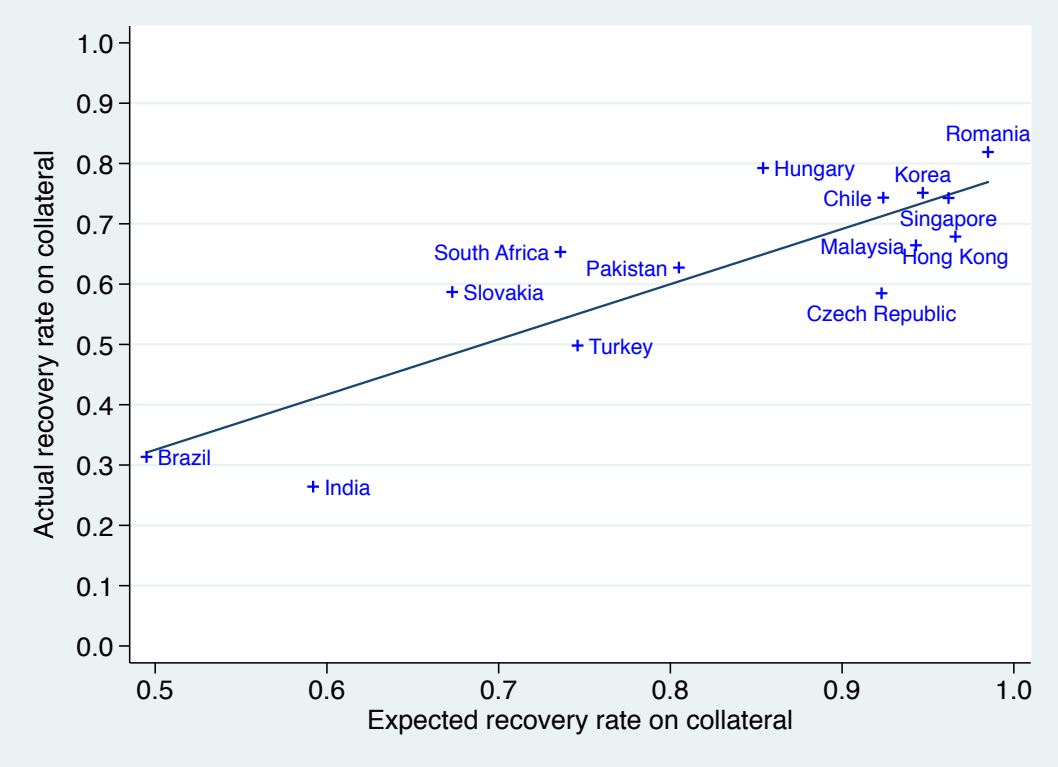

Figure 6
Actual Recovery Rates on Loans and Expected Recovery Rates on Collateral: Country-Level Evidence

This figure plots the relation between expected recovery rate on collateral against the actual recovery rate on loans at the country level. The average is taken during the period 2002–2004. Actual Recovery Rate on Loans is provided by the bank's lending program on an aggregate basis at the country level and represents the actual recovery rate on a dollar lent to a borrower. *Expected Recovery Rate on Collateral* is the average expected recovery rate on a dollar of collateral value for all borrowers in each country. The number of countries is reduced from 16 to 14 since there are no data available on actual recovery rates on loans for two countries.

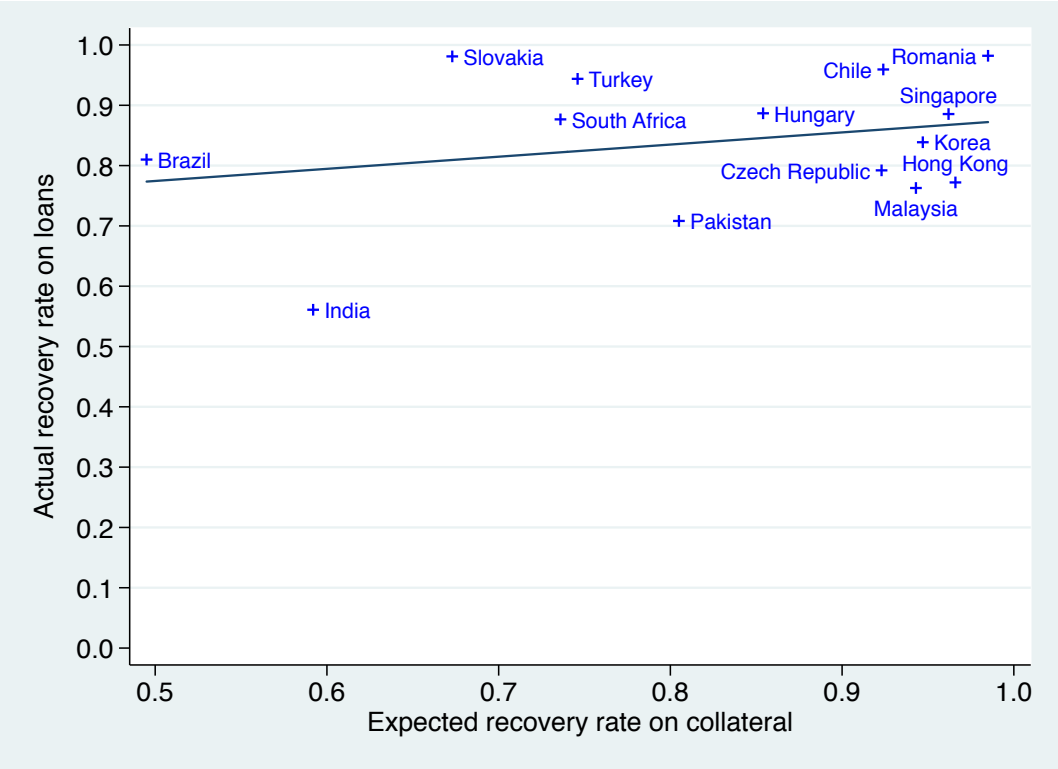

Table 1
Data Description by Country and Sample Comparison with DHMS

This table presents the distribution of data by country along with indicators of creditor rights in each country. The data come from a sample of 7,422 small and medium-sized enterprises (SMEs) in 16 economies that are borrowing from the SMEs lending division of a large multinational bank. The countries are reported in alphabetical order. The top row indicates the data source. The last two rows compare our sample to the sample used in DHMS. Table A2 in the Appendix provides detailed definitions for all variables and the respective sources.

	Sample				Rules in the books						Enforcement in Practice				Information Sharing	
	All Borrowers		Multiple Assets		Creditor Rights					DB		Enforcement Procedure				
Country	# Obs	# Firms	# Obs	# Firms	Index	Reorganization Restrictions	No Automatic Stay	Secured Creditors First	Management doesn't Stay	Collateral Law Index	Contract Enforcement Days	Foreclosure	Reorganization	Liquidation	Public Registry	Private Bureau
	(1)	(2)	(3)	(4)	(3)	(4)	(5)	(6)	(7)	(8)	(10)	(11)	(12)	(13)	(14)	(15)
1 Brazil	201	201			1	0	1	0	0	2	566	0	0	1	1	1
2 Chile	442	348	154	60	2	0	1	1	0	3	305	1	0	0	1	1
3 Czech	674	631	86	43	3	0	1	1	1	5	300	0	0	1	1	1
4 Hong Kong	1,404	1,277	254	127	4	1	1	1	1	8	211	1	0	0	0	0
5 Hungary	342	227	194	79	1	1	0	0	0	6	365	1	0	0	0	1
6 India	1,379	602	1,182	405	2	1	0	1	0	5	425				0	0
7 Korea	1,811	1,213	1,176	578	3	0	1	1	1	6	75	0	1	0	0	1
8 Malaysia	773	627	272	126	3	1	1	1	0	8	300	0	0	1	1	1
9 Pakistan	256	96	226	66	1	0	0	1	0	5	395				1	0
10 Romania	154	134	39	19	2	0	1	1	0	6	335	0	1	0	0	0
11 Singapore	276	241	67	32	3	0	1	1	1	8	69	1	0	0	0	0
12 Slovakia	275	157	191	73	2	0	1	1	0	8	565	0	0	1	1	0
13 South Africa	551	395	286	130	3	1	0	1	1	8	277	0	0	1	0	1
14 Sri Lanka	86	86			2	1	0	0	1	2	440	1	0	0	0	1
15 Taiwan	426	373	105	52	2	0	0	1	1	3	210	0	1	0	1	1
16 Turkey	1,096	814	512	230	2	1	1	0	0	3	330	0	1	0	1	0
Total/Average																
Our sample	10,146	7,422	4,744	2,020	2.19	0.44	0.56	0.75	0.44	5.375	323	0.36	0.29	0.36	0.44	0.50

Table 2
Collateral Composition and Creditor Rights

This table presents OLS estimates of regression collateral composition on country creditor rights. In columns (1) and (2), the unit of observation is the loan level, the sample is all loans, and the dependent variable is a dummy variable equal to one if a loan is secured with movable collateral. In columns (3) and (4), the unit of observation is at the loan-level. The sample is all loans with movable collateral pledged as security, and the dependent variable is a dummy variable equal to one if a loan is secured with bundled collateral, i.e., both movable and immovable collateral are pledged against the same loan. *Creditor Rights* is a dummy variable that equals one if a country's value of the LLSV creditor rights index equals 3 or higher, and zero otherwise. Tables A1 and A2 in the Appendix provide definitions and descriptive statistics for all variables, including the firm characteristics used as controls. ***, **, * indicate statistical significance at the 1, 5, and 10 percent levels. Standard errors are reported in parentheses and are clustered at the country level.

	Pr(Movable Collateral)		Pr(Bundled|Movable Collateral)	
	(1)	(2)	(3)	(4)
Creditor Rights	0.137*	0.144**	-0.145**	-0.157***
	(0.068)	(0.064)	(0.050)	(0.040)
Firm Composition				
Firm Ratings		Included		Included
Loan Size		Included		Included
Firm Size		Included		Included
Balance Sheet Data (4 Ratios)		Included		Included
Fixed Effects				
Time	Included	Included	Included	Included
Industry	Included	Included	Included	Included
Observations	8,695	8,695	5,426	5,426
R-squared	0.06	0.07	0.08	0.13

Table 3
Expected Recovery Rates, Collateral Types, and Creditor Rights: Summary Statistics

This table presents summary statistics for the bank's expected recovery rates on collateral. Summary statistics are provided for all countries in our sample and for high- and low-creditor-rights countries separately, denoted as HCR and LCR, respectively. Countries with values of the LLSV creditor rights index equal to or greater than 3 are classified as HCR countries, while countries with values equal to or lower than 2 are classified as LCR countries. The sample is all assets pledged as collateral and the unit of observation is the asset-level. *Movable* is a dummy variable that takes a value of one if the assets collateralizing a loan include accounts receivable, equipment & vehicles, and firm-specific assets, and zero otherwise. *Immovable* is a dummy variable that takes a value of one if the assets collateralizing a loan include real estate, financial instruments and bank letters of credit, and zero otherwise. Panel A presents all countries, Panel B presents a country-level univariate difference-in-differences across LCR and HCR countries and immovable and movable assets, where ***, **, * indicate statistical significance at the 1, 5, and 10 percent levels. For each panel, we provide expected recovery rates for all collateral classes (Average), break down summary statistics for immovable and movable collateral, and report the difference in recovery rates across immovable and movable collateral. Table A2 in the Appendix provides definitions for all variables.

Panel A: All Countries				
	Average	Non-Movable	Movable	Diff
All Countries	0.805	0.985	0.631	-0.354**
Panel B: Low vs. High Creditor Rights				
	Average	Non-Movable	Movable	Diff
LCR	0.741	0.983	0.537	-0.447***
HCR	0.913	0.989	0.789	-0.200**
High CR-Low CR	0.172**	0.006	0.253**	0.247**

Table 4
Expected Recovery Rates, Movable Collateral, and Creditor Rights

This table presents OLS estimates of equations (1) and (2). The dependent variable is the bank's expected recovery rate on collateral. *Movable* is a dummy variable that equals one if collateral is movable, and zero otherwise. *Creditor Rights* is a dummy variable that equals one if a country's value of the LLSV creditor rights index equals 3 or higher, and zero otherwise. The sample includes the first observation of all loans in columns (1)–(4) and the first observation of all loans for borrowers with multiple loans only in columns (5) and (6). Columns (1) and (2) include country and time fixed effects, columns (3) and (4) include country-industry-time fixed effects, column (5) includes borrower and time fixed effects, and column (6) includes borrower and country-industry-time fixed effects. Tables A1 and A2 in the Appendix provide descriptive statistics for all variables, including the firm characteristics used as controls and definitions, respectively. ***, **, * indicate statistical significance at the 1, 5, and 10 percent levels. Standard errors are reported in parentheses and are clustered at the country level.

	Expected Recovery Rate					
	Sample					
	All Borrowers				Multiple Assets	
	(1)	(2)	(3)	(4)	(5)	(6)
Movable	-0.302***	-0.448***	-0.428***	-0.395***	-0.453***	-0.461***
	(0.065)	(0.054)	(0.066)	(0.079)	(0.068)	(0.087)
Movable × Creditor Rights		0.307***	0.320***	0.261**	0.335***	0.364***
		(0.065)	(0.077)	(0.121)	(0.089)	(0.109)
Movable × Log GDP per Capita				0.030		
				(0.042)		
Firm Composition						
Firm Ratings	Included	Included	Included	Included	Included	Included
Loan Size	Included	Included	Included	Included	Included	Included
Firm Size	Included	Included	Included	Included	Included	Included
Balance Sheet Data (4 Ratios)	Included	Included	Included	Included	Included	Included
Fixed Effects						
Time	Included	Included			Included	
Country	Included	Included				
Industry	Included	Included				
Country-Industry-Time			Included	Included		Included
Borrower					Included	Included
Observations	10,146	10,146	10,146	10,146	4,744	4,744
R-squared	0.43	0.48	0.61	0.61	0.70	0.79

Table 5
Loan Interest Rates, Movable Collateral, and Expected Recovery Rates: Univariate Tests

This table presents summary statistics for the loan interest rates and the bank's expected recovery rates on collateral. Summary statistics are provided for all countries in our sample and for high- and low-creditor-rights countries separately, denoted as HCR and LCR, respectively. Countries with values of the LLSV creditor rights index equal to or greater than 3 are classified as HCR countries, while countries with values equal to or lower than 2 are classified as LCR countries. The sample is all assets pledged as collateral and the unit of observation is the asset-level. *Movable* is a dummy variable that takes a value of one if the assets collateralizing a loan include accounts receivable, equipment & vehicles, and firm-specific assets, and zero otherwise. *Immovable* is a dummy variable that takes a value of one if the assets collateralizing a loan include real estate, financial instruments and bank letters of credit, and zero otherwise. Panel A and B presents the average interest rates expected recover rates, respectively. Both panels also present the country-level univariate difference-in-differences across LCR and HCR countries and immovable and movable assets, where ***, **, * indicate statistical significance at the 1, 5, and 10 percent levels. Panel B provides the average expected recovery rates for all collateral classes, break down summary statistics for immovable and movable collateral, and report the difference in recovery rates across immovable and movable collateral. Table A2 in the Appendix provides definitions for all variables.

Panel A: Interest Rate

	All Collateral	Movable	Immovable	Movable - Immovable
	N=1,350	N=682	N=668	
All Countries (N=1,350)	7.159	7.433	6.879	0.554***
LCR Countries (N=754)	7.478	7.886	7.049	0.837***
HCR Countries (N=596)	6.755	6.841	6.670	0.171
LCR-HCR Countries	0.723***	1.045***	0.379	0.666***

Panel B: Expected Recovery Rate

	All Collateral	Movable	Immovable	Movable - Immovable
	N=1,350	N=682	N=668	
All Countries (N=1,350)	0.798	0.635	0.964	-0.329***
LCR Countries (N=754)	0.712	0.492	0.943	-0.451***
HCR Countries (N=596)	0.905	0.821	0.989	-0.168***
LCR-HCR Countries	-0.193***	-0.329***	-0.046**	-0.283***

Table 6
Loan Interest Rates, Movable Collateral, and Expected Recovery Rates

This table presents OLS estimates where we explain the loan interest rate as a function of the type of collateral pledged, the recovery rate of the collateral pledged, and a set of control variables. *Loan Interest Rate* is the interest rate charged to the firm by the bank (in %). *Recovery Rate* is the bank's expected recovery rate on the collateral guaranteeing the loan. *Movable* is a dummy variable that equals one if the collateral is movable, and equals zero otherwise. *Movable* is a dummy variable that equals one if the collateral is movable, and equals zero otherwise. *Creditor Rights* is a dummy variable that equals one if a country's value of the LLSV creditor rights index equals 3 or higher, and equals zero otherwise. The sample includes the first observation of all loans for borrowers with multiple loans made at different times only. All estimations include borrower and time fixed effects. Tables A1 and A2 in the Appendix provide descriptive statistics for all variables, including the firm characteristics used as controls, and definitions, respectively. ***, **, * indicate statistical significance at the 1, 5, and 10 percent levels. Standard errors are reported in parentheses and are clustered at the borrower level.

	Interest Rate			
	(1)	(2)	(3)	(4)
Movable	0.643***	1.050***		
	(0.132)	(0.184)		
Movable × Creditor Rights		-0.786***		
		(0.262)		
Recovery Rate			-0.929***	-0.931***
			(0.264)	(0.296)
Recovery Rate × Creditor Rights				0.010
				(0.685)
Firm Composition				
Firm Ratings	Included	Included	Included	Included
Loan Size	Included	Included	Included	Included
Firm Size	Included	Included	Included	Included
Balance Sheet Data (4 Rati	Included	Included	Included	Included
Fixed Effects				
Borrower	Included	Included	Included	Included
Time	Included	Included	Included	Included
Observations	1,350	1,350	1,350	1,350
R-squared	0.83	0.84	0.83	0.83

Table 7

Spread in Recovery Rates and Creditor Rights: Going Beyond Creditor Rights

This table presents OLS estimates of an augmented version of equation (2) that examines alternate enforcement law and institutions. The dependent variable is the bank's expected recovery rate on collateral. *Movable* is a dummy variable that equals one if collateral is movable, and zero otherwise. *Creditor Rights* is a dummy variable that equals one if a country's value of the LLSV creditor rights index equals 3 or higher, and zero otherwise. *Collateral Creation* measures the ability to write loan contracts with movable collateral and is determined by adding one for each one of the first five components, and creating a dummy variable equal to one if the sum is above the median sum across countries and zero otherwise. *Collateral Registry* measures whether a movable collateral registry is in operation and is equal to one if the sixth component is equal to one, and zero otherwise. *Collateral Enforcement* measures whether a lender may enforce its security right over movable collateral out of court and is equal to one if the seventh component is equal to one, and zero otherwise. The sample includes the first observation of all loans for borrowers with multiple loans only. All estimations include borrower and time fixed effects. Tables A1 and A2 in the Appendix provide descriptive statistics for all variables, including the firm characteristics used as controls and definitions, respectively. ***, **, * indicate statistical significance at the 1, 5, and 10 percent levels. Standard errors are reported in parentheses and are clustered at the country level.

	Expected Recovery Rate				
	(1)	(2)	(3)	(4)	(5)
Movable	-0.553*	-0.547***	-0.513***	-0.380***	-0.680***
	(0.267)	(0.094)	(0.102)	(0.110)	(0.008)
Movable × Reorg. Restrictions	0.095				
	(0.117)				
Movable × No Automatic Stay	0.185*				
	(0.097)				
Movable × Secured Creditors First	0.001				
	(0.250)				
Movable × Management Doesn't Stay	0.242*				
	(0.124)				
Movable × Collateral Creation		-0.157			
		(0.106)			
Movable × Collateral Registry		0.017			
		(0.118)			
Movable × Collateral Enforcement		0.383**			
		(0.139)			
Movable × Foreclosure			0.321**		
			(0.143)		
Movable × Reorganization			0.121		
			(0.110)		
Movable × Log Contract Days				-0.195**	
				(0.076)	
Movable × Information Sharing					0.386***
					(0.117)
Movable × Creditor Rights		0.233**	0.294**	0.234*	0.263**
		(0.116)	(0.104)	(0.130)	(0.126)
Firm Ratings	Included	Included	Included	Included	Included
Loan Size	Included	Included	Included	Included	Included
Firm Size	Included	Included	Included	Included	Included
Balance Sheet Data (4 Ratios)	Included	Included	Included	Included	Included
Fixed Effects					
Borrower	Included	Included	Included	Included	Included
Time	Included	Included	Included	Included	Included
Observations	4,744	4,744	4,744	4,744	4,744
R-squared	0.72	0.73	0.70	0.72	0.74

Appendix: Table A1
Summary Statistics

This table presents summary statistics for the variables employed in the empirical analysis. *St. Dev* stands for standard deviation, and *Obs.* for the number of observations. We have data in 70 industries (at the two-digit SIC level). *Recovery Rate* is the bank's expected recovery rate on collateral. *Movable* is a dummy variable that equals one if collateral is movable, and zero otherwise. *Firm rating* is the bank's ex ante risk grade of the firm, with *A* denoting high-quality firms. *Firm size* is a sales size indicator (0 to 3) capturing the size of a firm.

	Mean	St. Dev	Std. Dev. within Country	Std .Dev. within Country-Industry	Std .Dev. within Borrower	Median	Obs.
Borrower Level Information							
Recovery Rate = OLV/FMV	0.857	0.253	0.193	0.176	0.148	1	10,146
Movable	0.542	0.498	0.433	0.392	0.367	1	10,146
Interest Rate Spread	7.863	3.618	3.031	2.615	0.628	6.717	10,146
Firm Rating							
A = 1	0.926	0.262	0.236	0.185	0.022	1	10,146
B = 2	0.042	0.201	0.187	0.134	0.018	0	10,146
C = 3	0.017	0.129	0.105	0.070	0.008	0	10,146
D = 4	0.015	0.121	0.099	0.064	0.007	0	10,146
Firm Size							
0	0.368	0.482	0.378	0.326	0.025	0	10,146
1	0.405	0.491	0.434	0.399	0.035	0	10,146
2	0.154	0.361	0.336	0.295	0.032	0	10,146
3	0.072	0.259	0.225	0.185	0.014	0	10,146
Loan Size (in USD)	530,636	1,030,815	819,000	698,100	209,013	200,000	10,146
Collateralization by Asset Class:							
Account Receivables	0.096	0.294	0.188	0.166	0.206	0	10,146
Equipment & Vehicles	0.276	0.447	0.271	0.226	0.189	0	10,146
Firm-Specific Assets	0.170	0.375	0.289	0.266	0.272	0	10,146
Real Estate	0.308	0.462	0.356	0.317	0.234	0	10,146
Financial Instruments	0.123	0.329	0.252	0.213	0.236	0	10,146
Bank Letters of Credit	0.027	0.163	0.122	0.064	0.034	0	10,146
Balance Sheet Information							
Cash/Total Assets	0.051	0.039	0.036	0.030	0.007	0.049	10,146
Account Receivables/Total Assets	0.234	0.143	0.113	0.098	0.023	0.255	10,146
PP&E/Total Assets	0.394	0.318	0.238	0.198	0.041	0.312	10,146
Inventory/Total Assets	0.263	0.178	0.156	0.131	0.024	0.233	10,146

Appendix: Table A2
Brief Descriptions of Legal and Institutional Variables and Their Sources

This table provides a description of the legal and institutional variables employed in our analysis. *DMS* stands for Djankov, McLiesh, and Shleifer (2007), *LLSV* for La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997, 1998), *DB* for the Doing Business index of the World Bank, and *DHMS* for Djankov, Hart, McLiesh, and Shleifer (2008).

Variable	Definition	Source
LLSV Index	An index aggregating different creditor rights, following La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998). The index is formed by adding one when: (1) the country imposes restrictions such as creditors' consent or minimum dividends to file for reorganization; (2) secured creditors are able to gain possession of their security once the reorganization petition has been approved (no automatic stay); (3) secured creditors are ranked first in the distribution of the proceeds that result from the disposition of the assets of a bankrupt firm; and (4) the debtor does not retain the administration of the property pending the resolution of the reorganization. The index ranges from 0 to 4..	DMS—values for year 2002
Reorganization Restrictions	Equals one if the reorganization procedure imposes restrictions such as creditors consent; equals zero otherwise.	DMS—values for year 2002
No Automatic Stay	Equals one if the reorganization procedure does not impose an automatic stay on the assets of the firm on filing the reorganization petition. Automatic stay prevents secured creditors from gaining possession of their security. Equals zero if such a restriction does exist in the law.	DMS—values for year 2002
Secured Creditors First	Equals one if secured creditors are ranked first in the distribution of the proceeds that result from the disposition of the assets of a bankrupt firm. Equals zero if imsecured creditors, such as the government and workers, are given absolute priority.	DMS—values for year 2002
Management Doesn't Stay	Equals one when an official appointed by the court, or by the creditors, is responsible for the operation of the business during reorganization. Equivalently, this variable equals one if the debtor does not retain the administration of the property pending the resolution of the reorganization process, and equals zero otherwise.	DMS—values for year 2002
Collateral Law Index	The strength of the collateral law index measures the degree to which collateral laws protect the rights of borrowers and lenders and thus facilitate lending. The strength of collateral law includes eight aspects related to legal rights in collateral law. The index ranges from 0 to 8,	DB—data taken from 2005

	with higher scores indicating that collateral laws are better designed to expand access to credit.	
Rule of Law	Assessment of the law and order tradition in a country.	LLSV
Legal Origin	A dummy variable that identifies the legal origin of the bankruptcy law of each country.	DHMS
Contract Enforcement Days	The number of days to resolve a payment dispute through courts.	DLLS
Enforcement Procedure	DHMS ask insolvency practitioners which procedure is likely to be used in each country for debt enforcement of a hypothetical hotel (foreclosure, liquidation, or an attempt at reorganization).	DHMS
Public Registry	A database owned by public authorities (usually the central bank or banking supervisory authority), that collect information on the standing of borrowers in the financial system and make this information available to financial institutions.	DMS
Private Bureau	A private commercial firm or nonprofit organization that maintains a database on the standing of borrowers in the financial system. Its primary role is to facilitate exchange of information among banks and financial institutions.	DMS
Collateral Creation	Measures the ability to write loan contracts with movable collateral and is determined by adding one for each one of the first five components that correspond to collateral creation, and creating a dummy variable equal to one if the sum is above the median sum across countries, and zero otherwise.	Doing Business (World Bank) —values for year 2005
Collateral Registry	Measures whether a movable collateral registry is in operation and is equal to one if the sixth component is equal to one, and zero otherwise.	Doing Business (World Bank) —values for year 2005
Collateral Enforcement	Measures whether a lender may enforce its security right over movable collateral out of court and is equal to one if the seventh component is equal to one, and zero otherwise.	Doing Business (World Bank) —values for year 2005

Asset Specificity	The median book value of the industry's "machinery and equipment + inventories" divided by the book value of total assets, employing U.S. Compustat data at a two-digit SIC code level. We create a dummy variable equal to one when an industry is above-median asset-specific and zero otherwise.	Compustat

Appendix: Table A3
Enforcement Law and Institutions Correlation Matrix

This table presents a correlation matrix of country-level enforcement law and institutions for the 16 countries in the sample. The first entry includes the correlation coefficient, and the second entry includes the *p*-value. Tables A1 and A2 in the Appendix provide descriptive statistics and definitions, respectively.

	OLV/FMV	Creditor Rights	Log GDP per Capita	Foreclosure	Reorganization	Log Contract Days	Collateral Creation	Collateral Registry	Collateral Enforcement	Information
OLV/FMV	1.000									
Creditor Rights	0.629	1.000								
	0.021									
Log GDP per Capita	0.489	0.489	1.000							
	0.090	0.090								
Foreclosure	0.505	0.051	0.483	1.000						
	0.078	0.868	0.095							
Reorganization	-0.140	-0.141	0.224	-0.365	1.000					
	0.649	0.646	0.461	0.220						
Log Contract Days	-0.612	-0.600	-0.633	-0.270	-0.356	1.000				
	0.026	0.030	0.020	0.372	0.232					
Collateral Creation	0.472	0.720	0.345	0.278	-0.365	-0.351	1.000			
	0.103	0.006	0.248	0.358	0.220	0.239				
Collateral Registry	0.481	0.537	0.367	0.501	-0.433	-0.239	0.843	1.000		
	0.096	0.059	0.218	0.081	0.139	0.431	0.000			
Collateral Enforcement	0.525	0.415	0.321	0.185	0.058	-0.500	0.527	0.625	1.000	
	0.066	0.159	0.284	0.546	0.851	0.082	0.064	0.022		
Information	0.128	-0.033	0.124	-0.178	0.234	0.286	-0.178	-0.101	0.101	1.000
	0.677	0.915	0.686	0.561	0.443	0.344	0.561	0.742	0.742	

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