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

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We show that laws and institutions that strengthen creditor protection increase expected recovery rates on collateral using unique internal bank data on ex-ante appraised liquidation and market values of assets pledged as collateral in 16 countries. Stronger creditor protection increases expected recovery rates on movable collateral relative to immovable collateral and shifts the composition of collateral towards movable assets, which increases debt capacity through both higher loan-to-values and attenuating the creditor's liquidation bias. Our results suggest that the recovery rate on collateral is an important first-stage mechanism through which creditor protection can improve contracting efficiency and enhance access to credit. **(***JEL* G2; G33; G38; K1)

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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 novel evidence on the importance of one mechanism— the impact creditor protection and debt enforcement procedures have on expected liquidation values on collateral and through this on the composition of assets securing a loan. We study expected liquidation values by measuring the expected recovery rate on collateral, defined as the ratio of the bank's ex ante appraised liquidation value to the fair market value of the pledged asset. We show that 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.

An extensive theoretical literature, starting with Barro (1976), Stiglitz and Weiss (1981), Aghion and Bolton (1992), Hart and Moore (1994, 1998), shows that pledging collateral increases firms' debt capacity. Providing creditors with the right to liquidate pledged assets if the firm defaults disciplines the firm, reduces the risk of strategic default through the threat of liquidation upon non-repayment, and enables financing ex ante. Crucial for this mechanism are creditors' expected liquidation values on the pledged assets (i.e., the amount they can expect to receive if they seize the pledge assets and sell them in the open market), which are expected to increase in creditor protection. All assets, however, are not made equal. A key maintained assumption in this literature, which has not been confirmed empirically, is that movable assets (e.g., inventory and accounts

[1] See, e.g., 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).

receivable) are less pledgeable and more vulnerable to weak creditor rights than immovable assets (e.g., real estate), because, for example, they are less redeployable, depreciate faster, are subject to agency concerns.[2]

Stronger creditor protection can impact financial contracting through at least two channels. First, stronger creditor protection leads to higher expected liquidation values. Second, to the degree that expected liquidation values on movable assets are more sensitive to creditor protection, the menu of assets that a firm can pledge as collateral becomes larger. Thus, creditor protection that improves creditors' bargaining power in default should increase firms' debt capacity. However, this increase in creditors' bargaining power may result in a liquidation bias, which in turn reduces debtors' demand for credit (Aghion, Hart, and Moore, 1992 and Hart et al., 1997). As shown in Gennaioli and Rossi (2013), allocating the controlling creditor a security interest on a firm's current and future cash flows from movable assets, such as inventory and accounts receivable, can act as an "equity stake" in the reorganized firm, attenuating their liquidation bias.

We use this theoretical framework to formulate predictions on how creditor protection and enforcement procedures affect expected recovery rates, the composition of pledged assets, and in turn the firm's debt capacity. The first set of tests we perform builds on the incomplete contracting literature and focuses on how the expected liquidation values of assets varies across asset class and creditor protection. The second set of tests examines predictions from Gennaioli and Rossi (2013) on how creditor protection shifts the composition of collateral pledged to a controlling creditor towards movable assets. The third set of tests directly examine how liquidation values relate to loan-to-value ratios and loan interest rates.

Our study uses 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, the data provides information on both the type of asset being pledged as collateral and two separate liquidation values for the pledged asset. The first is the fair market value (FMV) or replacement market value of the collateral securing a loan. Importantly, the FMV is independent of the expected costs of debt enforcement.

[2] See, for example, Hart and Moore (1994, 1998) and Gennaioli and Rossi (2013).

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 OLV-to-FMV ratio for each asset pledged, measuring the expected liquidation value per $1 market value of the pledged asset (i.e., the fraction of the collateral value that the bank expects to recover in liquidation).

Importantly, the information on OLVs and FMVs is available for a wide class of assets across countries with varying degrees of creditor protection, allowing us to bring key assumptions and predictions of the financial contracting literature to the data. Constructing expected recovery rates is something that the previous literature has been unable to do due to lack of data on the expected liquidation values of pledged assets. Further, data availability on loan contracts allows us to study how higher expected recovery rates on pledged assets influence the bank's credit supply in the form of higher loan-to-value ratios and lower borrowing costs.

A second advantage of the data is that using only one bank is beneficial as the secured loans offered are comparable across all countries. Since the bank's approval processes are similar across countries, we ensure that differences in the internal organization of lending within the GlobalBank do not contaminate our estimations.

We start by examining how expected recovery rates on collateral vary across asset class and creditor protection. We distinguish collateral as movable and immovable as it is standard in the collateral law literature and measure cross-country differences in creditor protection 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.[3,4] We estimate the within-country spread in the *Recovery Rate* between movable and immovable

[3] 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.

[4] The index is the sum of four variables measuring 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.

collateral and how this spread varies with creditor protection in a difference-in-differences framework with country fixed effects.

Identification relies on using recovery rates instead of liquidation values to directly absorb all valuation features common to FMV and OLV within an asset and the identification assumption is that that any omitted valuation factors affect both movable and immovable collateral equally within a country. Thus, any alternate mechanism explaining our results must differentially affect recovery rates on movable and immovable assets within the same country. One such factor may be due to systematic differences in secondary markets across countries due to differences in asset specificity or redeployability (Shleifer and Vishny, 1992; Williamson, 1988). Such factors, which are potentially specific to an industry or asset class and time-varying, may pose an identification threat if they systematically correlate with creditor rights. To address this concern, we also estimate specifications with country-industry-time and industry-collateral type-time fixed effects, which absorb time-series variation in recovery rates at the country-industry level and industry-asset class level, respectively.

We find that expected recovery rates on movable collateral are systematically lower than on immovable collateral. Our within-country estimates point to an average spread of about 30 percentage points. The size of the spread is systematically larger in weak creditor rights countries by about 31 percentage points: it is 44.8 percentage points in weak creditor rights countries as opposed to only 14.1 percentage points in strong creditor rights countries, consistent with the maintained assumption in the literature that weak creditor rights have more detrimental effects on the liquidation values of movable rather than immovable assets.

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. This within borrower specification relies on the identification assumption that firm characteristics affect recovery rates of movable and immovable collateral equally. Therefore, any alternative explanation must be able to explain variation in recovery rates across movable and immovable collateral within the same firm. Using this approach, the difference-in-differences estimate of the bank's expected 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.

Next, we focus on collateral composition. We find that the likelihood that a loan is secured with movable collateral increases in creditor rights. The average frequency of movable-backed loans is 14 percentage points higher in strong creditor rights countries than in weak creditor-rights countries. We also find that collateral composition moves away from immovable collateral—either alone or bundled with movable assets—in countries with stronger creditor protection. Combined, this evidence implies that collateral menu expands under stronger protection with movable assets becoming a viable alternative to immovable collateral, consistent with the theoretical work by Gennaioli and Rossi (2013) showing that movable collateral should be used in countries with stronger creditor protection to overcome the liquidation bias.

To better understand the economic mechanism driving our results we also explore different aspects of creditor rights and movable collateral that drive the empirical relation between the bank's expected recovery rates and creditor protection. We study alternate enforcement laws and institutions that govern creditors' bargaining power and control rights in default, characterized by both "rules in the books" and efficiency of enforcement in practice.[5] We find that efficient enforcement of debt contracts and security interests, in terms of both procedure and timing, are important. Enforcement that is slow or grants control to management in reorganization decisions is found to be particularly costly for movable assets, consistent with the notion that such assets depreciate faster and are more prone to agency problems. We also distinguish movable collateral into "physical" (e.g., machinery and equipment) and "non-physical" (i.e., inventory and account receivables). We find that while our results hold for both types of movable collateral, they are stronger for non-physical movable assets that are closest to the academic "cash flow" definition of movable collateral used in the financial contracting literature.

[5] We open-up the LLSV index into its individual components, we explore the role of movable collateral laws using data from the World Bank's Doing Business legal rights index, the procedure that is most likely to be used to resolve an insolvency in country from Djankov, Hart, McLeish, and Shleifer (2008), the quality of a country's legal system as measured by the number of days it takes to enforce a payment dispute through the courts from Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2003), and the presence of information sharing through credit registries and private credit bureaus.

Turning to the link between the bank's expected recovery rates on collateral and the firm's debt capacity we show that higher expected recovery rates on pledged assets translate into higher loan-to-value ratios (higher quantities) and lower loan interest rates (lower prices) across loans within the same firm, consistent with an increase in the firm's debt capacity. One standard deviation increase in the *Recovery Rate* of about 25 percentage points is associated with a 17.45 percentage points increase in the loan-to-value ratio and a 23 basis points decrease in the loan interest rate. This result, combined with our earlier findings on expected recovery rates and collateral composition, is consistent with an equilibrium effect in which stronger creditor protection increases the bank's credit supply by improving their recovery rates and enlarging the set of asset types firms can pledge as collateral.

Finally, to evaluate the credibility of our key explanatory variable, we also contrast the bank's expected recovery rates against the bank's ex post realized recovery rates on collateral of defaulted loans that the bank enforced. We find a positive relation between the two variables, suggesting that the bank's expected recovery rates are useful in terms of assessing their actual recoveries in the future.

The paper contributes to the literature by providing a first empirical test of key assumptions and predictions of the financial contracting literature studying firms' debt capacity and optimal capital structure under incomplete contracts (e.g., Aghion and Bolton, 1992; Hart and Moore, 1994, 1998; Gennaioli and Rossi, 2013). Such tests were previously not possible due to the lack of data on expected liquidation values on pledged assets.

The paper also contributes to the vast empirical literature relating law and finance with the usage of collateral by providing direct evidence on one of the underlying mechanisms driving previously established associations between creditor rights and financial development— namely, the impact creditor rights and debt enforcement procedures have on expected recovery rates and composition of pledged assets. The analysis in our paper is complementary to Calomiris, Larrain, Liberti, and Sturgess (2017) who show that loan-to-value ratios 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 the impact creditor rights have on expected recovery rates and composition of collateral and, in turn, on firms' debt capacity. 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. Similar to DHMS, our focus is on the efficiency of debt enforcement and its impact on lenders' expected recovery rates, holding other related channels constant.

We also contribute to the empirical literature studying the relation between liquidation values and firms' access to credit and terms of credit. A few studies show that proxies for higher liquidation values on assets pledged as collateral are associated with larger loans with longer maturities, lower interest rates and higher credit ratings (e.g., Benmelech Garmaise, and Moskowitz, 2005; Benmelech, 2009; Benmelech and Bergman, 2008 and 2009; Chaney, Sraer and Thesmar, 2011). To proxy variation in the liquidation value of assets, they use variation in asset specificity or redeployabily by exploiting, for example, commercial zoning regulations, number of potential buyers in secondary markets. By observing liquidation values directly, we are able to shed light on the specific laws and institutions that enhance the use collateral, holding constant the role of such factors.

The remainder of the paper is organized as follows. In Section 1 we outline the theoretical framework that guides our analysis and specify a set of testable empirical predictions we bring to the data. In Section 2 we describe the data in more detail. In Section 3 we discuss our empirical strategy. In Section 4 we present our findings on how creditor protection affects the expected recovery rates and the composition of assets securing loans. In Section 5 we explore how expected recovery rates affect loan-to-value ratios and interest rates. In Section 6 we study how expected recovery rates map into realized recoveries. Conclusions follow in Section 7.

1. Theoretical Framework and Testable Predictions

In this section we discuss the theoretical framework that guides our empirical analysis. We bring together the parts of the theoretical literature (their key assumptions and predictions) that are most relevant to our empirical analysis. We focus on the mechanisms that drive the empirical relation between collateral and firm's debt capacity and their interaction with creditor protection.

Starting with Barro (1976), Stiglitz and Weiss (1981), Aghion and Bolton (1992), Hart and Moore (1994, 1998), among others, an extensive theoretical literature shows that in the presence of contract incompleteness, collateral increases a firm's debt capacity. Providing creditors with the right to liquidate the pledged assets if the firm defaults on its contractual obligations acts as a strong disciplinary device on borrowers, which enables financing ex ante. Strategic default is averted by the threat of liquidation upon non-repayment.

The firm's debt capacity and optimal financial structure is shown to depend crucially on the expected liquidation values of the firm's pledged assets i.e., the amount that creditors can expect to receive if they seize the pledged assets from the borrower and sell them in the open market. A key maintained assumption in these models is that firm cash flows, y, (movable collateral) are less pledgeable than physical collateral, L, (immovable collateral). In Hart and Moore (1998) the entrepreneur can "divert" the project cash flows on a one-to-one basis, while she cannot "steal" the physical assets underlying the project. The firm's debt capacity in this case is entirely determined by the expected liquidation values of the firm's pledged immovable assets, L. The assumption that movable collateral can be fully diverted is of course extreme, which taken literally would be at odds with the fact that movable assets are sometimes pledged as collateral (see, e.g., Cerqueiro et al., 2016, Calomiris et al., 2017).

Although incomplete contracting models of financial contracting employ the key assumption that firm movable assets are less pledgeable than immovable assets due to lower expected liquidation values, this has not been confirmed empirically due to a lack of data on expected asset liquidation values.

Prediction 1: Movable collateral has lower expected liquidation values than immovable collateral.

Maintaining Hart and Moore's assumption that immovable collateral is less pledgeable than immovable collateral, Gennaioli and Rossi (2013) allow the pledgeability of movable assets to increase with creditor rights and study how the firm's optimal debt structure varies with creditor protection.[6] In their setting, stronger investor protection safeguards the investor from managerial "tunneling" increasing the share α of the firm's cash flows,

[6] In the spirit of Hart and Moore, Gennaioli and Rossi maintain the assumption that immovable collateral is fully pledgeable. Immovable collateral could be assumed to be partially pledgeable and their results would go through as along as movable collateral remains less pledgeable than immovable collateral.

y, that the entrepreneur can be legally compelled to pay to the investor ex post and can therefore credibly pledged to the investor ex ante. Hence, the firm's debt capacity increases to $L + \alpha \cdot y$, where $\alpha \cdot y$ represents the expected liquidation value of movable collateral.

Prediction 2: The expected liquidation values on movable collateral are more sensitive to creditor protection than the expected liquidation values on immovable collateral.

Stronger investor protection does not come without costs. Aghion, Hart, and Moore (1992) and Hart et al. (2007) show that stronger investor protection creates incentives for lenders to liquidate assets over restructuring and therefore a liquidation bias may exist. With this in mind, Gennaioli and Rossi (2013) allow firms to pledge both movable and immovable collateral and show that the optimal capital structure consists of two classes of creditors. One class is concentrated in a large creditor (e.g., a bank) who has exclusive control over the liquidation vs. reorganization decision of the defaulting firm. The other debt class is dispersed among small creditors with no control rights (e.g., trade creditors).

The first best outcome is that the large creditor is allocated control rights over liquidation and receives a combination of movable collateral, which removes the controlling creditor's liquidation bias, and immovable collateral. Giving the controlling creditor movable collateral acts as an equity stake in the reorganized firm, incentivizing the lender to restructure instead of prematurely liquidating the firm. Where immovable assets are pledged to the controlling creditor, under-collateralization in immovable assets—a novel feature in their analysis— can also serve to attenuate the liquidation bias. The degree to which the controlling creditor can be pledged movable assets will depend on the pledgeability of movable assets, which will in turn depend on the strength of creditor protection and the expected liquidation value on movable collateral, $\alpha \cdot y$.

Prediction 3: The likelihood that loans are secured with movable collateral increases in creditor protection.

Since the pledgeability of movable assets increases with creditor protection, a key implication of Gennaioli and Rossi's model is not only that movable collateral should be used more but that the composition of collateral should also change with creditor protection. Specifically, the higher pledgeability of movable assets in countries with stronger creditor protection should result in the controlling creditor receiving movable assets

instead of immovable assets because pledging movable collateral becomes a viable alternate mechanism for attenuating the liquidation bias. Hence, one might expect to observe collateral composition evolving from immovables-only, to a combination of immovables and movables, and finally to movables-only as creditor protection strengthens.

Prediction 4: The composition of collateral should move away from immovable collateral and towards movable collateral as creditor protection strengthens.

Prediction 4 yields two empirical predictions. First, the use of immovable collateral should decrease with creditor protection, which is in accordance with prediction 3. Second, bundling of immovable collateral and movable collateral should also decrease with creditor protection, such that when creditor protection is at its strongest the controlling creditor receives only movable collateral because movable assets both are highly pledgeable under strong creditor prediction and attenuate the liquidation bias. Predictions 3 and 4 combined imply that immovable collateral is used less, both alone and combined with movable collateral, in countries with stronger creditor protection that enhances the pledgeability of movable assets.

Finally, we can examine if stronger creditor protection that enhances recovery rates increases a firm's debt capacity by increasing credit supply, consistent with the incomplete contracting models of financial contracting. These theories predict that GlobalBank's expected recovery rates map into higher loans-to-value ratios and lower interest rates. In this regard it is important to note, that while we have detailed information on the GlobalBank's expected liquidation values on pledged assets, we have limited balance sheet information about the firm. This prevents us from directly testing predictions about the composition of the firm's debt and allocation of control across multiple creditors. This also means that we cannot test if stronger creditor protection leads to a contraction in demand for credit as has been documented in recent work (Acharya et al., 2011, Lilienfeld-Toal, Mookherjee, and Visaria, 2012, Vig, 2013, and Schoenherr, 2018).

In the next section, we explain in detail how we bring these predictions to the data.

2. Empirical Strategy

Data availability on the GlobalBank's expected liquidation values on a wide class of assets and across countries with varying degrees of investor protection allows us to bring these key assumptions and predictions of the theoretical literature to the data. To map theory to the data we make a few important steps, including assumptions that we later relax. Throughout, we assume that the GlobalBank is the firm's large creditor, consistent with the bank receiving control rights via secured lending. We outline all additional steps in detail below.

To test prediction 1, we estimate the share of movable assets that can be pledged to the lender ex-ante, i.e., α, by examining how the GlobalBank's ex ante appraised liquidation values (i.e., at origination) on movable assets vary compared to liquidation values of immovable assets. As indicated earlier, we observe two separate liquidation values for each asset. The first liquidation value is the fair market value (FMV) or replacement market value of the collateral being pledged for a particular loan. The second liquidation value is the orderly liquidation value (OLV), which is the liquidation value given the country's institutional framework and efficiency of enforcement.[7] We construct comparable expected recovery rates as the ratio of OLV-to-FMV for each asset pledged, measuring the expected liquidation value per $1 market value of asset pledged. This measure maps directly into the fraction α of collateral value that is not lost in liquidation. Studying recovery rates instead of liquidation values directly absorbs all valuation features common to FMV and OLV within an asset.[8]

Hence, to test prediction 1, we estimate the average difference in the bank's expected recovery rates between movable and immovable collateral within each country using the following model:

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

[7] Section 3 provides more detail on the definition and measurement of the fair market value and orderly liquidation value.

[8] To the extent that market values reflect not only fundamentals but also market imperfections (see, for example, Duffie, 2010), asset pledgability might affect market values. The FMV in that case should not only reflect the fundamental value, but also the OLV, which would bias the FMV downwards towards the OLV and result in an attenuation of cross-sectional differences in recovery rates. If so, our estimates would underestimate the effect of creditor protection on recovery rates.

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. $Firm_{i,t}$ is a vector of time-varying firm characteristics at time t. $\varepsilon_{k,i,c,t}$ is the idiosyncratic error term. The coefficient β_1 measures the average difference in *Recovery Rate* between movable and immovable collateral. We expect β_1 to be negative, consistent with prediction 1 that movable collateral has lower expected liquidation values than immovable collateral.

To test prediction, 2 we compare the difference between the *Recovery Rate* on movable and immovable collateral in countries with strong relative to weak enforcement laws using an augmented specification:

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

where $Creditor\ Rights_c$ is a dummy variable equal to 1 in HCR economies and zero otherwise, which is our benchmark measure of creditor protection. The coefficients of interest are β_1 and β_2. The coefficient β_1 measures the average difference in the *Recovery Rate* between movable and immovable collateral in LCR countries. β_2 measures the difference in the *Recovery Rate* 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.

Evaluating the impact of creditor protection in a difference-in-difference framework with country fixed effects absorbs all valuation features common to recovery rates within a country. Our identification assumption is that that any omitted valuation factors affect both movable and immovable collateral equally within a country. Thus, any alternate mechanism explaining our results must differentially affect recovery rates on movable and immovable assets within the same country. One such factor may be due to systematic differences in secondary markets *across* countries due to differences in asset specificity or redeployability (Shleifer and Vishny, 1992; Williamson, 1988). Such factors, which are potentially specific to an industry or asset class and time-varying, may pose an identification threat if they systematically correlate with creditor rights. To address this concern, we also estimate specifications with country-industry-time and industry-collateral type-time fixed effects, which

absorb time-series variation in recovery rates at the country-industry level and industry-asset class level, respectively.

We also include each country's economic development, measured as the GDP per capita, and also interact this with movable collateral. 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— and allows us to evaluate whether such factors are likely to affect movable and immovable collateral differently, violating our identification assumption.

A second concern with equation (2) relates to omitted factors *within* a country that may threaten the internal validity of our estimates such as 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 this concern, we also include borrower fixed effects, α_i, and 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.

To test prediction 3, we examine how collateral composition within countries varies with creditor protection by estimating the following model:

$$\Pr(\textit{Movable Collateral})_{k,i,c,t} = \alpha_t + \alpha_j + \beta_1 \textit{Creditor Rights}_c + \gamma_1 \textit{Firm}_{i,t} + \varepsilon_{k,i,c,t}. \quad (3)$$

where $\textit{Movable Rate}_{k,i,c,t}$ is a dummy variable equal to one if the loan is secured with movable collateral, and is equal zero otherwise. We expect β_1 to be positive, consistent with prediction 3 that the likelihood that loans are secured with movable collateral increases with strength of creditor protection.

Similarly, we test prediction 4 by examining how collateral composition within a borrower varies with creditor protection by estimating:

$$\Pr(\textit{Bundled} \mid \textit{Movable Collateral})_{k,i,c,t} = \alpha_t + \alpha_j + \beta_1 \textit{Creditor Rights}_c + \gamma_1 \textit{Firm}_{i,t} + \varepsilon_{k,i,c,t}, \quad (4)$$

where the sample in (4) includes all loans secured with movable collateral and the dependent variable, $Bundled_{k,i,c,t}$, is a dummy variable that equals one if a loan is secured with "bundled" collateral i.e., both movable and immovable collateral are pledged against the same loan. We expect β_1 to be negative, consistent with prediction 4 that the likelihood that a loan is secured with immovable collateral decreases in creditor protection.

Throughout, we employ the terminology movable and immovable collateral that is commonly used in law (see UCC Chapter 9 in the U.S. and World Bank collateral law data), regulation (see the E.U. Single Rule Book), and hence by lenders. This classification differs slightly from the academic classification of physical assets and cash flows that is common to incomplete contracting models of financial contracting. In additional tests, we also open up movable collateral into physical (i.e., equipment) and non-physical (i.e., inventory and accounts receivable) to examine more precisely how α varies by creditor protection.

In sum, our identification relies on using recovery rates instead of liquidation values to directly absorb all valuation features common to FMV and OLV within an asset, within borrower estimates to absorb borrower selection concerns across collateral type, and the assumption that other country characteristics affect recovery rates on movable and immovable assets equally. In addition, we show that our results are robust to valuation concerns relating to redeployability and liquidity in secondary markets through the inclusion of country-industry-time and industry-collateral type-time fixed effects. Nonetheless, as with any study of this nature, it is possible that: i) our results obtained in emerging market countries are not generalizable to developed countries with deeper financial markets and more sophisticated institutions; and ii) laws evolved because countries with a comparative advantage in movable-asset sectors had a greater need to develop creditor protection that improves the enforcement of movable collateral.

3. Data Description

Our data comes primarily from three sources: the small and medium-sized enterprise (SME) lending division of the GlobalBank; 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.

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 of 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.[9] 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 the firm's financing choices, the expected costs of debt enforcement, or a discount due to asset fire sales or the presence of constrained buyers, as in Shleifer and Vishny (1992), for example.

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

[9] The definition of FMV 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 FMV 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."

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.[10]

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.[11] Both the FMV and OLV are appraised at loan origination, and hence are *expected* liquidation values.

We combine the FMV and OLV to construct the expected recovery rate (*Recovery Rate*) on collateral as the ratio OLV/FMV. As mentioned earlier, the *Recovery Rate* measures the liquidation value per $1 market value of collateral pledged and by construction, the ratio absorbs all valuation features common to FMV and OLV within an asset pledged by a firm. Hence, the *Recovery Rate* provides a unique real-world estimate of the expected loss in collateral values when 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, the interest rate spread, the liquidation values and type of collateral ("asset class") securing each loan.

To test predictions 1 and 2 we examine the *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

[10] The American Society of Appraisers defines OLV 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."

[11] 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.

7,422 firms in our sample of 16 countries.[12] 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).[13] 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 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

[12] 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.

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

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.[14]

To capture the efficiency of enforcement in practice, we employ two indicators: Contract Days and Enforcement Procedure. 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.[15] To capture information sharing we use a dummy variable indicating whether a public credit registry or a private credit bureau is operational in the country, taken from Djankov, McLiesh, and Shleifer (2007). Although not an enforcement procedure, information sharing institutions facilitate the screening and monitoring of borrowers (see, e.g., Jappelli and Pagano 1993; Padilla and Pagano 1997, 2000; Djankov, McLiesh, and Shleifer, 2007) and could influence banks' recovery rates on pledged assets by decreasing double-pledging and tunneling possibilities.

[14] 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.

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

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 equals 1 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 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. With respect to information sharing, 44 percent of the countries have a *Public Registry* in place and 50 percent have a *Private Bureau*.

4. Debt enforcement and GlobalBank's secured lending

In this section, we analyze how the GlobalBank's recovery rates vary between immovable and movable collateral (prediction 1) and how differences in debt enforcement across countries affect these valuations (prediction 2) as well as the type of collateral employed in the GlobalBank's loans (predictions 3 and 4).

4.1. Recovery rates, movable collateral, and creditor rights

We start by examining how the expected recovery rate in each country varies with creditor rights. 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.

(Insert Figure 1 about here)

In Table 2, we provide descriptive statistics on recovery rates by creditor protection and asset type. The average *Recovery Rate* for our sample is 0.805, but varies significantly across immovable and movable assets. Consistent with prediction 1, we find that the bank's expected recovery rate for movable collateral is

significantly lower than for immovable collateral (63.1% as opposed to 98.5%; a difference of -35.4 percentage points that is statistically significant at the 5%-level). Interestingly, immovable collateral has an expected recovery rate near 100%, consistent with the full pledgeability assumption, typically maintained in the theoretical literature.

(Insert Table 2 about here)

The bank's expected recovery rates also vary systematically across creditor rights. The average *Recovery Rate* is 91.3% in HCR countries and 74.1% in LCR countries. The difference of 17.2 percentage points is statistically significant at the 1%-level, which indicates that GlobalBank assigns higher recovery valuations to assets in countries with strong debt enforcement. Opening up further by collateral type, we observe that the *Recovery Rate* on movable collateral are much lower in LCR than in HCR countries (53.7% for LCR countries versus 78.9% for HCR countries). The *Recovery Rate* on movable collateral are instead very similar (98.3% for LCR countries versus 98.9% for HCR countries). This is consistent with prediction 2 that weak creditor rights have a more detrimental effects on the liquidation values of movable assets than immovable assets, reflected in the 24.7% difference-in-difference in average recovery rates between movable and immovable collateral.

To formally test predictions 1 and 2 we estimate equations (1) and (2) to compare GlobalBank's expected recovery rates on movable and immovable collateral across all countries controlling for country-, time-, industry-fixed effects and borrower characteristics.[16] The results are presented in Table 3. In column (1), we find that the *Recovery Rate* on movable collateral is lower than the *Recovery Rate* on immovable collateral, consistent with prediction 1. Our estimates point to an average within-country spread in the expected recovery rates of movable and immovable collateral of 30.2 percentage points, which is comparable to the univariate estimates in Table 2.

(Insert Table 3 about here)

[16] Throughout, standard errors are clustered at the country level and computed using block bootstrapping owing to the small number of clusters (see, for example, Cameron et al. 2008). Additionally, in unreported results, we re-run the tests in columns (1) to (4), but cluster standard errors at the country-industry level. Results are stronger than clustering at the country level.

In column (2), we examine how the recovery rate spread compares across weak and strong creditor rights countries. Consistent with prediction 2, the spread is substantially more pronounced in weak-creditor-rights countries. Our estimates indicate an average spread of –44.8 percentage points in weak-creditor-rights countries as opposed to only –14.1 percentage points with strong-creditor-rights countries. 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.[17]

Comparisons of the estimates in Table 3 with the univariate difference-in-differences of 24.7 percent in Table 2 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 recovery rates on movable collateral by 57 percent (0.307/0.537).

One potential concern with our estimates in column (2) is that differences in secondary markets across countries that differentially affect movable assets, such as asset redeployability or asset specificity, may bias our estimates. Such omitted country characteristics, which are potentially specific to an industry or asset class and time-varying, may pose an identification threat if they systematically correlate with creditor rights. For the most part, the literature has measured asset redeployability or asset specificity at the industry-level (see Stromberg, 2000; Acharya, Bharath, and Srinivasan, 2007; and Kim and Kung, 2017).[18] Hence to address this concern, in

[17] 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* 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."

[18] Rare exceptions that examine redeploaybility within an asset class include Benmelech Garmaise, and Moskowitz (2005) Benmelech (2009), and Bergman and Benmelech (2009).

column (3) we allow for country-industry-time and industry-asset-time fixed effects.[19] If results were due to larger discounts on movable assets because of lower redeployability or more illiquid secondary markets in weak creditor rights countries, these specification would absorb these effects. Results, however, are very similar to those obtained in column (2) suggesting that these factors are unlikely to be driving our results.

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. 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.[20] The coefficient of the interaction term with GDP per capita is statistically insignificant and close to zero, suggesting again that omitted country characteristics are unlikely to affect movable and immovable collateral differently.

The results in columns (1) – (4) likely understate the degree to which recovery rates are affected by creditor rights for two reasons. First, in the absence of strong creditor protection, the composition of borrowers is likely to shift toward more seasoned credit risks. Second, in responses to weak creditor protection and weak enforcement laws, lenders are also expected to demand better-quality collateral (prediction 4).

To help mitigate this downward bias and obtain a more precise measure of the true effect, we examine the effect of creditor rights on recovery rates in a borrower fixed effects framework. The sample size reduces from 10,146 to 4,744 because, as shown in Table 1, only 2,022 borrowers pledge multiple collateral types in 4,744 observations. Results are reported in column (5). They are qualitatively unchanged with those reported earlier, but the magnitude of coefficient on the interaction between *Movable* and *Creditor Rights* increases by approximately 10 percent. In column (6) we report results from a specification including country-industry-time and industry-collateral type-time. Again, this specification absorbs valuation effects that might be due, for example, to local economic fluctuations faced by an industry or specific to an asset type within a particular

[19] The coefficient on *Movable* is absorbed in the specifications with industry-asset-time fixed effects.

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

industry. Results are again qualitatively unchanged, but the magnitude of coefficient on the interaction between *Movable* and *Creditor Rights* increases by approximately 10 percent.

4.2. Collateral composition and creditor rights

Next, we analyze the relation between creditor protection and collateral composition. For each of the 16 countries in our sample, we calculate the frequency of movable-backed loans. In Figure 2 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 statistically significant. In particular, the average frequency of movable-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 creditor protection, consistent with prediction 3 that the pledgeability of movable collateral increases in creditor rights.

(Insert Figure 2 about here)

In Figure 3, we examine how collateral bundling (i.e., when a loan is backed by both movable and immovable collateral) varies with creditor protection. For each of the 16 countries in our sample, we calculate the frequency of movable-backed loans that are also backed by immovable collateral. We find that 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. This inverse relationship between credit protection and collateral bundling is consistent with prediction 4 that as the pledging movable collateral becomes a viable alternative in strong creditor rights countries, the need for collateral bundling with immovable assets decreases.

(Insert Figure 3 about here)

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

column (1) we estimate equation (3) to focus on the proportion of loans backed with movable collateral.[21] The average frequency of movable-backed loans is 14 percentage points higher in HCR countries, which is significant at the 5% level. In column (2) we estimate equation (5) to examine collateral bundling for the 5,426 of 8,695 loans that have at least some movable assets pledged as collateral. We find that the average frequency of bundle-backed loans is 16 percentage points lower in HCR countries, which is significant at the 1%-level. Combined, Table 4 and Figures 2 and 3 are consistent with the notion that stronger creditor protection is associated with a larger collateral menu that in particular allows firms to pledge movable assets as collateral and enhance their debt capacity. As the pledgeability of movable assets increases, the need for both pledging immovable collateral and collateral bundling with immovable assets decreases.

(Insert Table 4 about here)

The fact that we find a difference 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 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.

4.3. Further evidence on debt enforcement laws and collateral types

In this section, we dig deeper into the economic mechanisms driving our results by looking at the different aspects of creditor protection and types of movable collateral ("physical" vs. "non-physical") that drive the empirical relation between the bank's expected recovery rates and creditor protection.

To better understand the facets of creditor protection and 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

[21] The number of observations is lower than the 10,146 presented in Table 1 because we focus on loan-level observations in Table 4, and some loans are backed with multiple forms of collateral.

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 judgment from Djankov et al. (2008); and whether a country has a public credit registry or private bureau.[22]

In Table 5, we evaluate the impact of these procedures on Globalbank'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 does not 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 consistent with theory is that management have greater bargaining power over movable assets because management has a greater opportunity to tunnel movable assets than immovable assets.

(Insert Table 5 about here)

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*. In column (2) of Table 5, we report the within-borrower estimates of equation (2) where we include the three components of movable collateral law in addition to the creditor rights index. We find that the *Recovery Rate* on movable collateral relative to immovable collateral are substantially higher in countries with stronger movable collateral laws, specifically in relation to collateral enforcement, which allows creditors to enforce claims on movable assets. The effect of creditor protection on movable collateral recovery rates, which

[22] Appendix Table A3 presents pairwise correlations between the alternate enforcement variables.

captures broader creditor power, are smaller but remain significant when we examine enforceability of movable collateral.[23]

In column (3), we examine how the expected enforcement procedure in DHMS affects the 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 is the most likely procedure 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. This underlines again 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 column (4) of Table 5 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.

[23] 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 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.

In the last column of Table 5, we explore the role of information sharing through a credit registry or private credit bureau. Information sharing allows creditors to better screen and monitor borrowers (see, for example, Jappelli and Pagano 1993 and Padilla and Pagano 1997, 2000). Estimation results in column (5) indicate that expected recovery rates on movable collateral relative to immovable collateral are 38.6 percentage points higher when information sharing is present over and above the more general creditor rights index.

The results in Table 5 indicate that efficient enforcement of debt contracts and security interests, in terms of both procedure and timing, are particularly important in explaining variation in the bank's expected recovery rates on movable assets. The results on enforcement procedure, out-of-court enforcement on movable collateral, and information sharing show that laws and institutions that allocate more control to creditors increase recovery rates in addition to the broader role of creditor protection. Two potential and complementary interpretations of these findings are: i) allocating greater bargaining power to creditors alleviates strategic default concerns; and ii) enforcement that is slow or grants control to management in reorganization decisions is especially costly for movable assets that are less redeployable, depreciate faster, and are subject to agency concerns.

To examine more precisely how creditor protection affects recovery rates on movable assets, we decompose movable collateral into movable collateral that is "physical" (e.g., machinery and equipment) and "non-physical" in the sense that it represents a security interest on the firm's current and future cash flows from "floating assets" such as inventory and accounts receivables. We present results that test predictions 1 and 2 by estimating equations (1) and (2) in Table 6. We find that while our earlier results hold for both types of movable collateral, they are stronger, both economically and statistically, for movable assets that are closest to the academic "cash flow" definition of movable collateral that is used in the financial contracting literature.

(Insert Table 6 about here)

5. LTV ratios, loan interest rates, and expected recovery rates

In this section, we study how stronger creditor protection work through recovery rates on pledged assets to enhance the firm's debt capacity. In particular, we examine how LTV ratios and interest rates of loans backed

with movable assets versus immovable assets vary with creditor protection. We use our within borrower framework to mitigate borrower selection concerns and focus on borrowers that contract with GlobalBank by pledging movable and immovable collateral against two or more distinct loans.

These borrowers are a subsample of the sample of borrowers we study in columns (5)-(7) of Table 3, which comprises both borrowers that pledge movable and immovable collateral at the same time against the same loan and those that pledge movable and immovable collateral against multiple loans. We focus on borrowers that pledge movable and immovable collateral against multiple loans because LTV ratios and 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 subsample includes 1,350 of the original 4,744 observations.

We begin in Table 7 by providing descriptive statistics. Panel A provides descriptive statistics for LTV ratios. The average LTV ratio in our sample is 70.5% (i.e., the bank lends 70.5 cents against each $ of collateral value). Consistent with movable collateral being less pledgeable than immovable collateral, the average LTV ratio for movable collateral is 58.4% relative to 82.8% for immovable collateral. Consistent with stronger creditor protection increasing the pledgeability of movable assets, the average LTV ratios for loans backed by movable collateral increase by 39.4 percentage points (from 41.4% to 80.9%) as we move from LCR to HCR countries. Loans backed by immovable collateral have consistently high LTV ratios and increase only by 4.4 percentage points (from 80.7% to 85.1%) as we move from LCR to HCR countries, pointing to a difference-in-difference spread in LTV ratios of 35 percentage points.

(Insert Table 7 about here)

Panel B provides descriptive statistics for interest rates. The loan interest rate available in our data is the net spread— 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 movable over immovable collateral 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 creditor rights shows that loan interest rates are 66.6 basis points higher on movable loans than immovable loans in LCR countries compared with HCR countries.

In Panel C, we confirm that the expected recovery rates in the sub-sample of 1,350 observations vary with creditor rights and collateral type in the same way as for the full sample, reported in Table 2.

In Table 8 we study how the LTV ratios and interest rates vary with recovery rates in a cross-sectional difference-in-differences framework with borrower fixed effects. This allows us to directly map the bank's expected recovery rates on assets securing a loan to the equilibrium loan quantity and price. This comparison is made within the same borrower, controlling for borrower and time fixed effects as well as other loan and borrower characteristics (including the GlobalBank's assessment of credit risk) and it is thus free from unobserved heterogeneity issues that generally plague test of the empirical relation between collateral and loan supply.

(Insert Table 8 about here)

We find that conditional on $1 of market value of pledged collateral, a higher expected recovery rate on the pledged assets is associated with higher LTV ratios (higher quantity) and lower loan interest rates (lower price). In terms of magnitudes, our estimates indicate that a one standard deviation increase in the expected recovery rate of 25 percentage points is associated with a 17.45 percentage points increase in the LTV ratio and a 23 basis points decreases in the loan interest rate. The combination of a positive effect on quantities and negative effect on price rules out that a positive shift in the demand for credit is driving our results (which would yield a positive change in quantities and prices). This result, combined with the results in Table 3 and 4, is consistent with an equilibrium effect in which stronger creditor protection increases debt capacity through improving recovery rates and enlarging the set of asset types that can be pledged as collateral.

6. 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 loans are available in the data at the aggregate country level.[24] 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 4 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 4 about here)

In Figure 5 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 and higher borrowing costs, as shown in Table 8, but not necessarily lower recovery rates on loans. We find this is indeed 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.

(Insert Figure 5 about here)

7. 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

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

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.

We find that expected recovery rates on movable collateral are systematically lower than on immovable collateral by about 30 percentage points. The size of this difference is systematically larger in weak creditor rights. It is 44.8 percentage points in weak creditor rights countries as opposed to only 14.1 percentage points in strong creditor rights countries, consistent with the maintained assumption in the financial contracting literature that weak creditor rights have more detrimental effects on the liquidation values of movable assets. These results are robust to identification concerns regarding borrower composition and differences in the liquidity of secondary markets.

Additional analysis, exploring different aspects of creditor rights, both in the books and in practice, reveals that the efficient enforcement of debt contracts and security interests, in terms of both procedures and timing, has a large impact on liquidation values of pledged assets. Enforcement that is slow or grants control to management in reorganization decisions is found to be particularly costly for movable assets, consistent with the idea that such assets depreciate faster and are more prone to agency problems.

In terms of collateral composition, we find that as creditor protection improves, there is a move away from immovable collateral towards movable collateral—either alone or bundled with movable assets. In particular, we find that the average frequency of movable-backed loans is 14 percentage points higher in strong creditor rights countries than in weak creditor-rights countries. Similarly, the average frequency of bundle-backed loans is 16 percentage points lower in strong creditor rights countries than in weak creditor rights countries. These results imply that under strong protection, the collateral menu expands with movable assets becoming a viable alternative to immovable collateral, consistent with the theoretical work by Gennaioli and Rossi (2013).

Overall, our results provide novel evidence confirming key assumptions and predictions of the financial contracting literature and shows that recovery rates on pledged assets is an important first-stage mechanism

through which creditor protection affects firms' debt capacity and terms of credit. We show that higher expected recovery rates on pledged assets translate into a higher loan-to-value ratios and lower loan interest 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.

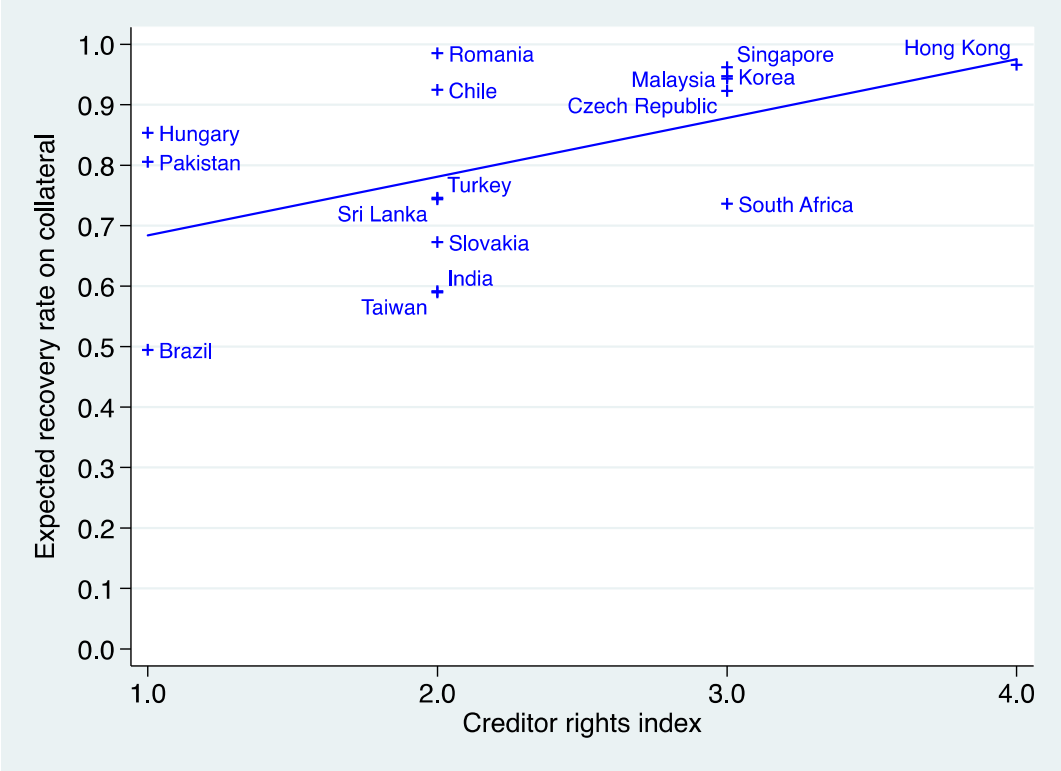

Figure 2
Movable Collateral Composition and Creditor Rights: Country-Level Evidence

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.

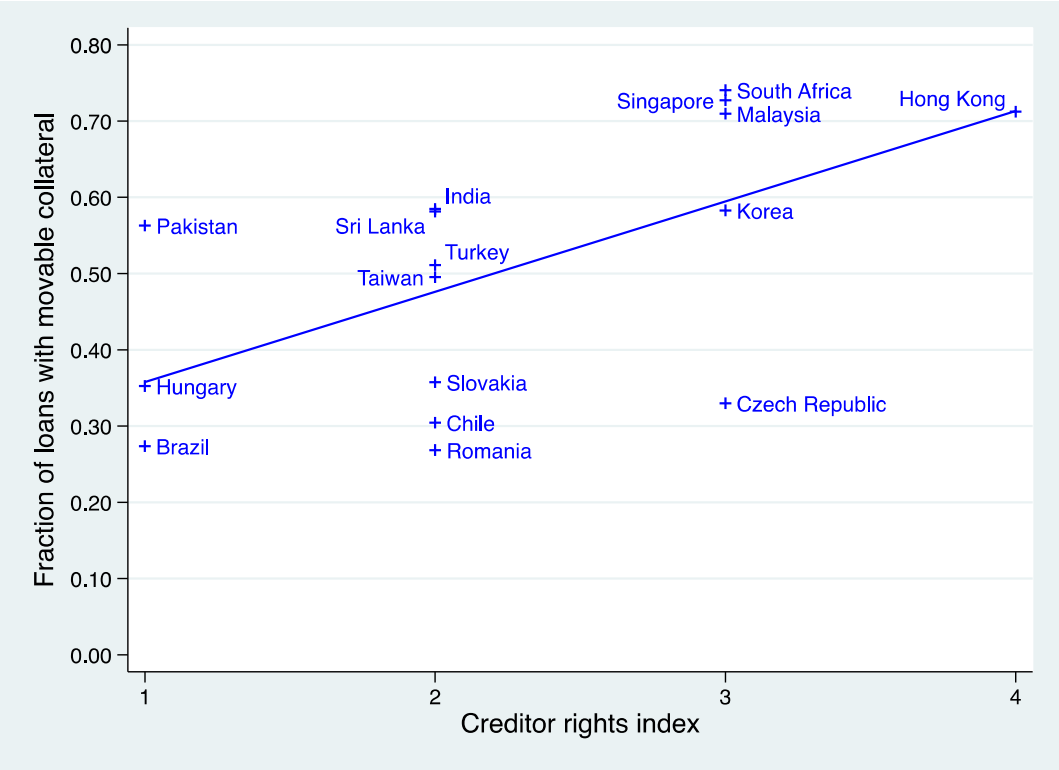

Figure 3
Collateral Bundling and Creditor Rights: Country-Level Evidence

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.

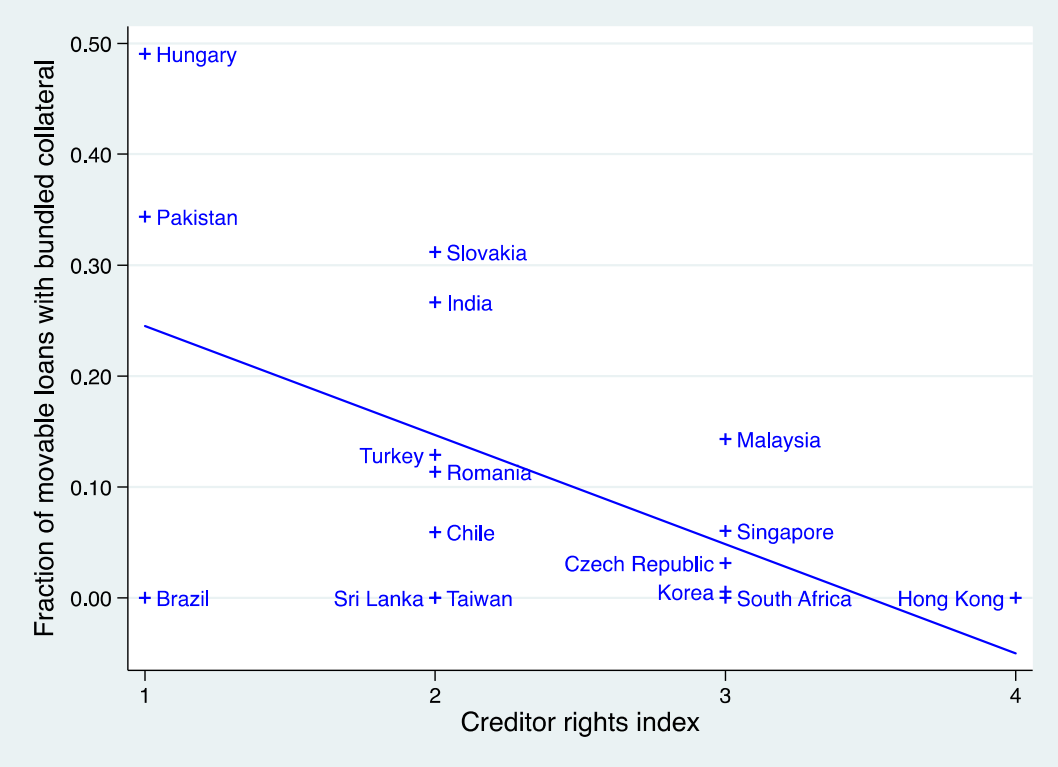

Figure 4
Actual Recovery Rates on Collateral and Expected Recovery Rates on Collateral: Country-Level Evidence

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.

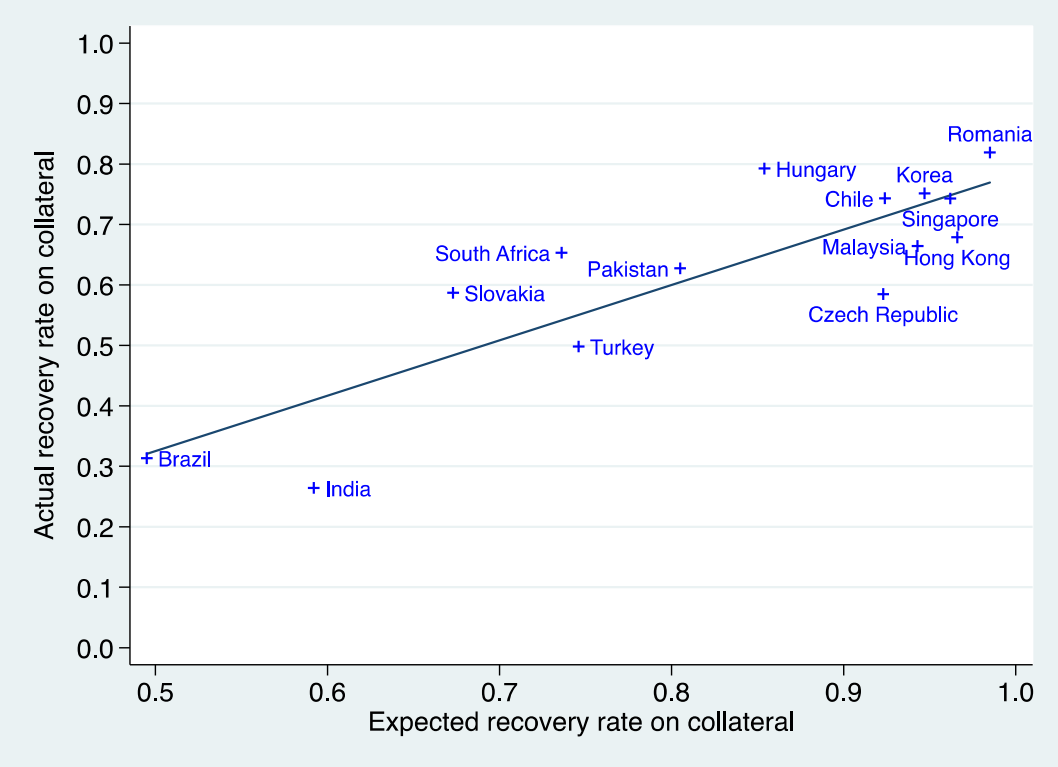

Figure 5
Actual Recovery Rates on Loans and Expected Recovery Rates on Collateral: Country-Level Evidence

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.

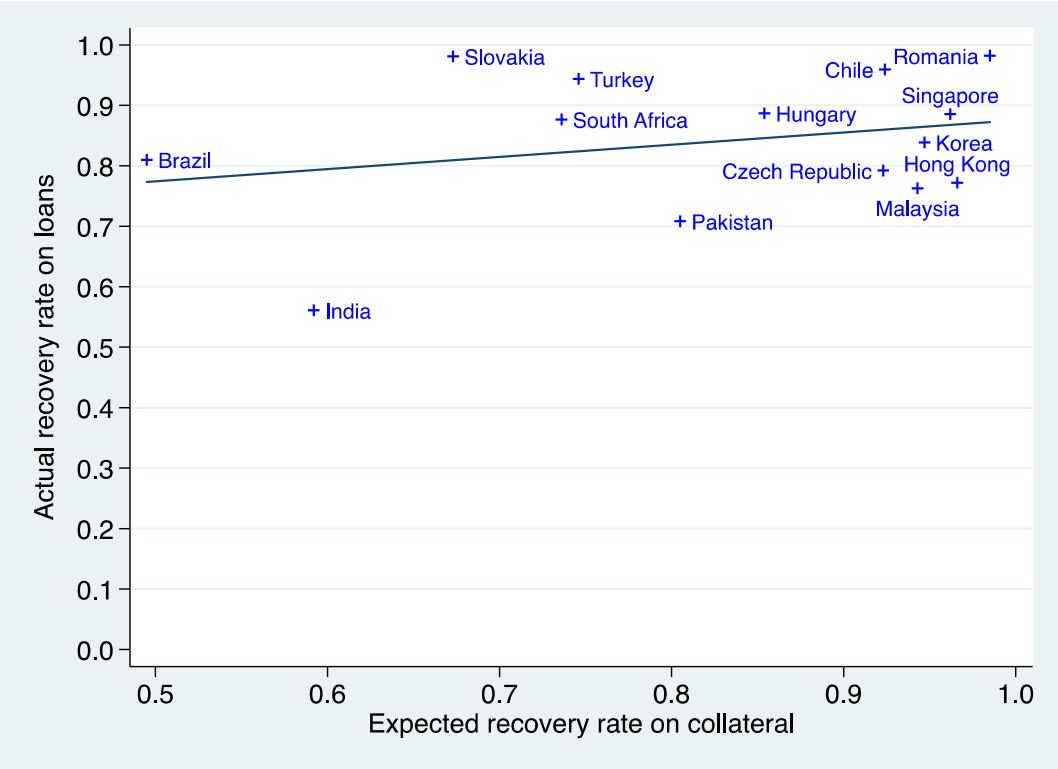

Table 1
Data Description by Country and Sample Comparison with DHMS

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 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
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 3
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 assets pledged against the first observation of all loans in columns (1)–(4) and the f assets pledged against the first 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 and industry-asset-time fixed effects, column (5) includes borrower and time fixed effects, column (6) includes borrower, country-industry-time and industry-asset-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 clustered using block-bootstrapping at the country level are reported in parentheses.

	Expected Recovery Rate					
	Sample					
	All Borrowers				Multiple Assets	
	(1)	(2)	(3)	(4)	(5)	(6)
Movable	-0.302***	-0.448***			-0.453***	
	(0.065)	(0.054)			(0.068)	
Movable × Creditor Rights		0.307***	0.326***	0.276**	0.335***	0.386***
		(0.065)	(0.071)	(0.122)	(0.089)	(0.074)
Movable × Log GDP per Capita				0.028		
				(0.034)		
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						
Country	Included	Included				
Borrower					Included	Included
Time	Included	Included			Included	
Industry	Included	Included				
Country-Industry-Time			Included	Included		Included
Industry-Collateral Type-Time			Included	Included		Included
Observations	10,146	10,146	10,146	10,146	4,744	4,744
R-squared	0.43	0.48	0.63	0.63	0.70	0.81

Table 4
Collateral Composition and Creditor Rights

This table presents OLS estimates of regression collateral composition on country creditor rights. In column (1) the dependent variable is a dummy variable equal to one if a loan is secured with movable collateral. In column (2) 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. The unit of observation is the loan level. In column (1) the sample is all loans. In column (2) the sample is all loans with movable collateral pledged as security. *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 clustered using block-bootstrapping at the country level are reported in parentheses.

	Pr(Movable Collateral)	*Pr(Bundled|Movable Collateral)*
	(1)	(2)
Creditor Rights	0.144**	-0.157***
	(0.064)	(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
Industry	Included	Included
Observations	8,695	5,426
R-squared	0.07	0.13

Table 5
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

Table 6
Expected Recovery Rates, Non-Physical and Physical 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—Non-physical* is a dummy variable that equals one if collateral is movable and non-physical, and zero otherwise. *Movable—Physical* is a dummy variable that equals one if collateral is movable and physical, and zero otherwise. Physical movable collateral includes machinery and equipment, Non-physical movable collateral security interests on the firm's current and future cash flows from "floating assets" such as inventory and accounts receivables. *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, column (6) includes borrower, country-industry-time, and industry-collateral type-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 clustered using block-bootstrapping at the country level are reported in parentheses.

	Expected Recovery Rate					
	Sample					
	All Borrowers				Multiple Assets	
	(1)	(2)	(3)	(4)	(5)	(6)
Movable - Non-physical	-0.523***	-0.617***			-0.600***	
	(0.083)	(0.068)			(0.061)	
Movable - Physical	-0.057	-0.116			-0.122*	
	(0.047)	(0.074)			(0.065)	
Movable - Non-physical × Creditor Rights		0.351**	0.412***	0.649***	0.380***	0.422***
		(0.118)	(0.117)	(0.200)	(0.103)	(0.116)
Movable - Physical × Creditor Rights		0.091	0.034	0.138	0.104	0.050
		(0.077)	(0.085)	(0.147)	(0.071)	(0.105)
Movable - Non-physical × Log GDP per Capita				-0.087		
				(0.054)		
Movable - Physical × Log GDP per Capita				-0.061		
				(0.056)		
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						
Country	Included	Included				
Borrower					Included	Included
Time	Included	Included			Included	
Industry	Included	Included				
Country-Industry-Time			Included	Included		Included
Industry-Collateral Type-Time			Included	Included		Included
Observations	10,146	10,146	10,146	10,146	4,744	4,744
R-squared	0.61	0.64	0.81	0.81	0.62	0.90

Table 7
Loan-to-Value, Interest Rates and Expected Recovery Rates: Univariate Tests

This table presents summary statistics for the loan-to-value (LTV), loan interest rates and the bank's expected recovery rates on collateral. *LTV* is the loan-to-value measured as the outstanding loan amount at origination divided by the fair market value of pledged collateral. Loan *Interest Rate* is the interest rate charged to the firm by the bank (in %). 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. *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. The sample includes the first observation of all loans for borrowers with multiple loans made at different times only. Panel A, B, and C presents the average LTVs, interest rates, and expected recover rates, respectively. 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. Table A2 in the Appendix provides definitions for all variables.

Panel A: Loan-to-Value (LTV) Descriptive Statistics

	All Collateral	Movable	Non-Movable	Movable - Non-Movable
	N=1,350	N=682	N=668	
All Countries (N=1,350)	0.705	0.584	0.828	-0.243***
LCR Countries (N=754)	0.607	0.414	0.809	-0.394***
HCR Countries (N=596)	0.829	0.807	0.851	-0.044**
LCR-HCR Countries	-0.222***	-0.392***	-0.042**	-0.350***

Panel A: Interest Rate Descriptive Statistics

	All Collateral	Movable	Non-Movable	Movable - Non-Movable
	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 C: Expected Recovery Rate Descriptive Statistics

	All Collateral	Movable	Non-Movable	Movable - Non-Movable
	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 8
Loan-to-Value, Loan Interest Rates, Movable Collateral, and Expected Recovery Rates

This table presents OLS estimates where we explain the loan-to-value (LTV) and loan interest rate as a function of the expected recovery rate of the collateral pledged, and a set of control variables. *LTV* is the loan-to-value measured as the outstanding loan amount at origination divided by the fair market value of pledged collateral. 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. 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.

	LTV	Interest Rate
	(1)	(2)
Recovery Rate	0.699***	-0.929***
	(0.022)	(0.264)
Firm Composition		
Firm Ratings	Included	Included
Loan Size	Included	Included
Firm Size	Included	Included
Balance Sheet Data (4 Ratios)	Included	Included
Fixed Effects		
Borrower	Included	Included
Time	Included	Included
Observations	1,350	1,350
R-squared	0.69	0.83

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 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	