When Do Laws and Institutions Affect Recovery Rates on Collateral?

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Abstract

We show that law and institutions that grant creditors stronger enforcement rights and bargaining power upon default increase expected collateral recovery rates by studying ex-ante appraised liquidation values on secured loans made by a single bank across 16 countries. Using within-borrower estimation, movable collateral, which is less redeployable, susceptible to agency problems, and faster to depreciate, exhibits lower recovery rates that are more vulnerable to enforcement. Further, the bank compensates for lower recovery rates through higher interest rates. The results highlight one of the economic channels through which law affects financial development and can explain cross-country variation in capital structure.

JEL-Codes: K4; G2; G33

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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), and particularly creditor rights. 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. The effect of bankruptcy law and institutions governing enforcement on firm borrowing, investment, and economic growth has been studied extensively using both country-level and micro data (see, among others, Boot, Aivazian, Demirgüç-Kunt and Maksimovic, 2001; Giannetti, 2003; Qian and Strahan, 2007; Haselmann, Pistor, and Vig, 2010; Cerqueiro, Ongena, and Roszbach, 2016; Calomiris et al., 2017).

There is, however, little empirical evidence on the underlying mechanisms through which law and institutions affect lending, firm, and economy-wide outcomes. In this paper, we provide evidence on the relevance of one mechanism – the impact that enforcement efficiency has on collateral values. Holding constant the impact that law and institutions have on the borrower's probability of default, we study their impact on the lender's expected recovery rates on collateral. Our analysis and results offer insights on "first stage" relationships that underpin the extant literature by documenting which aspects of laws and institutions matter the most, for which assets, and under which conditions. We find that stronger enforcement laws that shift bargaining power, or control, towards creditors in the event of default are associated with substantially higher expected recovery rates on collateral— particularly when the pledged assets are prone to agency problems, depreciate faster, and are less redeployable.

Collateral helps ensure, to a degree, that creditors earn a fair return should the firm be unable to repay—either because of a bad draw or because of managerial behavior.[1] Stronger enforcement of debt contracts affects the degree to which collateral reduces financial frictions by increasing the

[1] A rich theoretical literature highlights that secured debt, in which the creditor has the right to liquidate firm assets in the case of default, increases debt capacity when contracts are incomplete (see, e.g., Aghion and Bolton 1992; Hart and Moore 1994, 1998; Bolton and Scharfstein 1996; and Gennaioli and Rossi (2013)).

liquidation value, the value to the lender, which is typically lower than the market value, the value to the borrower. For example, enforcement of contracts may be inefficient; the time to claw back assets may be lengthy; the probability of orderly liquidation in which a seller is given reasonable time to find a buyer may be lower[2]; recovery and sale of assets may be costly; and borrowers may derive nontransferable private benefits. Our results thus underpin the existing literature by explicitly showing that enforcement (in)efficiency has a first order effect on what creditors expect to realize should they need to seize and sell the pledged assets and identifying where it matters most.

Despite the rich theoretical literature on the importance of liquidation values for debt capacity, there is scant empirical evidence on the ex-ante assignment of liquidation values and even less on how different legal and institutional frameworks affect these liquidation values. The reasons for the lack of empirical evidence on liquidation values are twofold. First, applied research on financial contracting has been at a disadvantage over theory due to the lack of micro-level data at the contract level. Loan-level data on lending and collateral that are comparable across economies with different law and institutions are rarely available. Additionally, one needs to observe not only the type of asset pledged as collateral securing each loan, but also the expected liquidation values and market values of the collateral. It is important to observe ex-ante assignments of liquidation values rather than ex-post liquidation values since the latter are only observed for those borrowers that actually default. Hence, examining how the law affects liquidation values using only ex-post measures could yield biased results as both the borrower's decision to default and the lender's decision to enforce the contract are not independent of liquidation values.[3] Second, one needs to identify the treatment effect of the law on liquidation values in a manner that rules out confounding country characteristics.

[2] The alternative to orderly liquidation, in which the seller is not forced to sell the asset but is given reasonable time to find a buyer, is forced liquidation where the sale is immediate. Forced liquidation values are generally lower than orderly liquidation values.

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

To overcome these hurdles, we use detailed micro-level data on loan originations from the small and medium-sized enterprise (SME) secured lending program of a single multinational bank operating in 16 emerging countries. The bank makes lending decisions in a decentralized manner, governed by local law, but offers similar secured credit products across countries. The data include not only the type of asset pledged as collateral securing each loan, but also the expected liquidation values and market values of the collateral. Therefore, we can measure the liquidation value per dollar of pledged collateral, or expected recovery rate upon enforcement, as the ratio of the liquidation value to the market value. This ratio measures the fraction of the pledged asset's value that the bank expects to recover upon enforcement, given the country's laws and institutions.

The SME lending program is well suited for studying the effects of law and institutions on the ex-ante assigned liquidation values. Examining recovery rates from a single bank allows us to make meaningful comparisons across countries because we are able to control for lender-specific factors influencing liquidation values. Observing contract-level loan data allows us to identify the type of collateral, which can influence liquidation values independently of law. Finally, we observe multiple loans for a subset of borrowers, meaning that we can compare liquidation values of different asset classes within a single borrower, which allows us to make meaningful comparisons across law and institutions, since we are able to control for both country and ultimately firm heterogeneity that may potentially explain liquidation values.

Before studying the drivers of the expected recovery rates on collateral, we start by presenting empirical evidence on the positive relation between a lender's expected recovery rate on collateral and the commonly employed loan-to-value (i.e., loan-to-market value) ratios. This link has been ignored in both the law and finance literature and bankruptcy law literature. We find that a lender's expected recovery rate on collateral is a key first-stage mechanism through which stronger enforcement law

that improves asset recovery rates can translate into loan-to-values, lending decisions, and real outcomes.

Next, we examine how cross-country variation in liquidation values relates to differences in creditor rights that describe the efficiency of debt enforcement. Laws that protect creditor control rights or procedures that allow timely seizure and sale of pledged assets, such as out-of-court foreclosure, allocate more control to creditors in the event of default. Knowing this, lenders should adjust asset liquidation values upward. We find precisely this: the bank expects to recover about 74 percent of the collateral value in liquidation in countries with weak creditor protection, but liquidation values are approximately 20 percentage points higher in countries with strong creditor protection.

We also examine how liquidation values vary across different types of collateral. We follow the Uniform Commercial Code (UCC) Article 9 in the United States, arguably one of the most developed markets in terms of enforcing collateral claims, to classify collateral as movable or immovable. Movable assets include machinery, equipment, inventory, and accounts receivable. Immovable assets include land and real estate along with financial assets such as bank guarantees and cash. Liquidation values on movable collateral may be lower for a few reasons. First, movable assets such as machinery or inventory may be less redeployable and hence more valuable in the hands of the debtor firm than the creditor or a second firm. Second, movable collateral is easier to divert. Third, the market value of the collateral might depreciate dramatically during long enforcement periods. Consistent with this, we find that the expected liquidation value on movable collateral is 63 percent—30 percentage points lower than liquidation values on other forms of collateral, with firm-specific assets such as inventory being the most discounted.

We find that the value of movable collateral is affected more by the quality of enforcement laws and institutions describing the ability of banks to accept, monitor, and enforce collateral than the value of immovable collateral. Employing a difference-in-differences estimation that absorbs

unobservable country-specific factors that might influence valuations, we find that liquidation values for movable assets are on average 30.7 percentage points higher, relative to liquidation values for other assets, in countries with strong creditor protection relative to countries with weak protection. [4]

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

To better understand the source of inefficiencies associated with weak creditor rights, we introduce the debt enforcement procedures outlined in Djankov, Hart, McLiesh, and Shleifer (2008; henceforth DHMS), collateral enforcement law, and information sharing. DHMS set the landscape of how debt enforcement varies at the institutional level by studying, in a survey, the role that laws and institutions play in the efficiency of debt enforcement using measures of direct enforcement costs, the way of disposing assets (i.e., preservation as a "going concern" versus "piecemeal sale"), and time to enforcement. We find that laws describing the ability of creditors to take control through foreclosure, enforce claims and collateral out of court, time to resolve enforcement, and the ability to screen and monitor borrowers through information sharing all affect liquidation values significantly.

We also find that the effects of law and institutions on liquidation values for movable assets we document depend on borrower characteristics and asset type. The difference between liquidation values on movable assets and immovable assets pledged by the same firm is larger when assets are less redeployable (Williamson, 1988; Shleifer and Vishny, 1992), for borrowers with worse credit

[4] Our results lend support to Gennaioli and Rossi (2013) who show, theoretically, that recovery rates of physical (immovable) collateral are higher than non-physical (movable) collateral and that expected recovery rates of collateral increase with creditor rights. Further, the ability to secure debt with floating charges over non-physical collateral in strong creditor protection countries both increases debt capacity and mitigates the controlling creditor's liquidation bias documented in Lilienfeld-Toal, Mookherjee, and Visaria (2012) and Vig (2013).

ratings, and for borrowers with more claims on their balance sheet. Consistent with theoretical predictions, the inability to enforce claims in a timely manner undermines the expected liquidation values on movable collateral more when the pledged assets are less redeployable, when borrower agency concerns are greater, and when other creditors are likely involved. These results help uncover channels through which inefficient enforcement undermines recovery rates on collateral.

We also examine how expected liquidation values on collateral interact with credit spreads within the same borrower (borrower-fixed effects help alleviate selection concerns associated with collateral being predominately required from riskier borrowers.) We show that credit spreads are, on average, negatively related to expected liquidation values, consistent with collateral lowering the cost of borrowing. However, this relation is predominant in countries with weak creditor protection, which suggests creditors might employ higher credit spreads where enforcement of loan contracts is poor.

Finally, we provide evidence on the use of the expected recovery rate on assets by the bank by examining the actual recovery rates on both collateral and loans. We show a positive relation between the expected and actual recovery rates on assets at the country level, which suggests that the bank finds the expected measures useful in terms of assessing actual recoveries in the future. Further, we document a positive but weaker correlation between expected recovery rates on collateral and actual recovery rates on loans, which implies that lenders price lower expected recovery rates on collateral by offering lower loan-to-values.[5]

Our study is perhaps most similar to DHMS, who study the role that laws and institutions play in the efficiency of debt enforcement in a case study of debt enforcement for a hypothetical mid-sized firm (a hotel) in 88 countries. In their setting, the focus is on how direct costs of enforcement affect recovery rates on one collateral type (the hotel) held constant across different countries. Thus, they abstract away from any sources of inefficiency arising from agency problems and variation in

[5] Similarly, Davydenko and Franks (2008) show that lenders in France, Germany, and the U.K. adjust lending practices in response to local bankruptcy law but find that lenders cannot still face different loan recovery rates across the three countries.

redeployability that may affect how law and institutions affect both the liquidation value and the types of collateral pledged, which is the focus of our study.[6]

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

We also contribute to empirical literature examining financial arrangements when contracting is incomplete. In particular, a few studies show that proxies for higher liquidation values on assets pledged as collateral are associated with longer debt maturity, lower interest spreads, and higher credit ratings. Benmelech, Garmaise, and Moskowitz (2005) find that more redeployable properties, based on commercial zoning regulation, receive larger loans with longer maturities and lower interest rates. Benmelech (2009) studies how specificity of track gauges on railroads in the United States affects debt structure. Bergman and Benmelech (2009) study U.S. airlines and show that loans for more redeployable airplanes have higher loan-to-value ratios. Chaney, Sraer, and Thesmar (2012) show that investment is sensitive to collateral value by examining real estate owned by U.S. firms pledged as collateral. Similarly, Ono et al. (2016) estimate the liquidation value of real estate collateral using a hedonic model of land prices. Further, Benmelech and Bergman (2008) show liquidation values may

[6] For example, in the case study they present to insolvency practitioners (in order to obtain information about how the insolvency case is likely to proceed given the country's laws and institutions and to build their measure of debt enforcement), they explicitly assume away tunneling.

tilt loan renegotiation power toward debtors, which affects loan recovery rates. Thus, loan recovery rates might be deflated further in economies with weak enforcement law where expected recovery rates on collateral are lower. We additionally document that less redeployable, more firm specific collateral carries lower liquidation values when enforcement is inefficient and takes a long time.

The remainder of the paper is organized as follows. In Section I we describe the data. In Section II we provide cross-country evidence on the main relations between laws, assets, recovery rates, and loan-to-value ratios. In Section III we discuss our empirical strategy. In Section IV we present our main findings on how laws and institutions impact on expected recovery rates on collateral and we explore whether higher expected recovery rates map into lower loan interest rates as well as actual recovery rates on collateral and loans. Our conclusions follow in Section V.

I. Data Description

Our data come from the SME lending division of a large multinational bank that operates in 16 economies that differ widely in terms of creditor rights, ranging from low-creditor-rights countries such as India, Turkey, and Chile to high-creditor-rights countries such as Korea, Malaysia, and Hong Kong. The data contain information for every loan issued by the bank's SME loan division over, on average, a two-year period from 2002 to 2004.[7] Table A1 in the appendix provides summary statistics for key variables from the bank's SME lending division. For each borrowing firm, we observe the loan origination, the industry they are operating, their size and internal risk rating as determined by the bank, and key balance sheet characteristics. For every loan origination, we observe the outstanding loan amount and interest rate as well as the value and type of each collateral ("asset class") securing each loan. Hence, for loan originations the unit of observation is at the *borrower-asset class-time*

[7] The average loan amount in the sample is US$576,000 for a set of countries with an average GDP per capita of $7,000 in 2003. Relative to the United States, where the GDP per capita in 2003 was US$37,000, this would correspond to an average loan amount of US$3 million.

level. We can have multiple observations for a borrower either because a firm has multiple loans issued over the sample period or because multiple asset classes secure a loan. We exploit this within-borrower variation for identification.

The bank's classification system distinguishes six asset classes: *Accounts Receivable*, *Equipment & Vehicles, Firm-Specific Assets*, *Real Estate*, *Financial Instruments*, and *Bank Letters of Credit*. The data in our analysis expand the original data used in Liberti and Mian (2010) as we are now able to incorporate a measure of the market liquidation value of assets pledged as collateral for each loan. Specifically, for each asset class, the bank records two values, both determined by external independent accredited appraisers at loan origination. The first is the fair market value (FMV) or replacement market value of the collateral being pledged for a particular loan. 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. Most importantly, this fair market value is independent of the expected costs of debt enforcement.[8]

The second value, also expressed in terms of money, 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 available buyers. The ability to seize the asset, the time to repossess the asset and the expected resale value in a secondary market conditional on getting the asset back are part of the dimensions contained in this measure. The OLV will reflect these conditions by reducing the value of the asset directly. In other words, OLV

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

represents the bank's expected liquidation value of the asset under normal market conditions—not under fire-sale or forced-sale conditions.[9]

With regard to the appraisal process, 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.[10]

The ratio OLV/FMV, which we refer to as the *RecoveryRate* on collateral, is our main variable of interest. *RecoveryRate* measures the liquidation value per $1 market value of collateral pledged. The *RecoveryRate*, by construction, absorbs any valuation features common to an asset within a country or even a firm. For example, if transaction costs are high for a particular asset in a given country, this should be reflected in both the OLV and FMV. Taking the ratio OLV/FMV should absorb such transaction costs. Hence, the *RecoveryRate* provides a unique real-world estimate of the expected loss in collateral values when enforcing a security interest. The OLV/FMV ratio is available for each type of collateral securing a loan. This level of disaggregation is important as different assets may be differentially affected by laws and institution that govern enforcement. Our difference-in-difference analysis exploits this variation to isolate the effect of interest from confounding factors.

We expect that, all else equal, in countries where creditors have weaker bargaining power and enforcing a security interest takes a long time, the bank's expected recovery rates on collateral may be particularly low for assets that are more susceptible to borrower agency problems and for assets that have fewer alternative uses (i.e., that are less "redeployable" or more "asset specific" and therefore

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

[10] 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.

have smaller and more illiquid secondary markets). We expect that *Movable* assets such as *Accounts Receivable*, *Equipment & Vehicles*, and *Firm-Specific Assets* are particularly vulnerable to such problems.[11] *Firm-Specific Assets* such as inventory may also become obsolete as time passes, further exacerbating the negative impact of fewer alternative uses. On the other hand, immovable assets such as *Real Estate* (e.g., land and other real estate) and creditor-held securities such as *Financial Instruments* (e.g., pledged deposits and other financial securities) and *Bank Letters of Credit* may be less prone to agency problems, because the creditor holds the asset, and are largely redeployable. They may also depreciate less as bankruptcy procedures drag on. We thus classify these asset classes as *Non-Movable* and hypothesize that their values are less sensitive to creditor rights.

Combining the six asset classes in the data into these two broad categories allows us to form a distinction based on "first principles" such as the underlying economic characteristics of collateral and the susceptibility of their liquidation values to credit rights and procedures that govern enforcement.[12]

To measure creditor rights, we collect several indicators that are commonly used in the literature to capture a secured creditor's ability to successfully enforce claims on defaulting borrowers. These measures span three main dimensions of creditor rights: "rules in the books," efficiency of enforcement in practice, and information-sharing mechanisms. As a benchmark indicator of "rules in the books," we use the creditor rights index taken from Djankov, McLiesh, and Shleifer (2007; hereafter DMS).[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

[11] See Article 9 of the U.S. Uniform Commercial Code (UCC) for definition and examples of movable collateral.

[12] Note that although Liberti and Mian (2010) use different terminology to refer to their two broad categories of collateral ("firm-specific collateral" and "non-specific collateral"), their grouping is essentially the same as ours and the underlying rational is similar. On page 166, for example, the authors write: "The value of firm-specific assets is more susceptible to concerns regarding a borrower's agency risk." In this paper, we use the terms *movable* and *non-movable,* as they better align with the literature that studies the institutional determinants of enforcing a security interest, especially those dealing with the legal aspects of the institutional framework.

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

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. 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 index measures the degree to which the country's collateral laws protect the rights of debtors and creditors facilitating lending.

To capture the efficiency of enforcement in practice, we employ three indicators: *Rule of Law*, *Contract Days*, and *Enforcement Procedure*. The *Rule of Law* index is a survey-based assessment by investors in different countries of the law and order environment they operate in, taken from LLSV. The index takes values from 0 to 10, with lower scores indicating less tradition for law and order. *Contract Days* is an indicator of the efficiency of the judicial system measuring the number of days it takes to resolve a payment dispute through the court system taken from Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2003; hereafter DLLS). *Enforcement Procedure* is a survey-based indicator developed by DHMS. It indicates which procedure (foreclosure, reorganization, or liquidation) is more likely to be used according to insolvency practitioners to recover a security interest in a hypothetical case of an insolvent firm given the country's laws and institutions.[14]

For information sharing, we use dummy variables indicating whether a public credit registry or a private credit bureau is operational (*Public Registry* and *Private Bureau*), taken from DMS.

[14] The DHMS countries cover all but two of our countries, India and Pakistan. In our main tests focusing on procedures from DHMS, we drop 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.

Information-sharing institutions collect information on the standing of borrowers in the financial system and make the data available to financial institutions, facilitating the screening and monitoring of borrowers (see, among others, Jappelli and Pagano 1993; Padilla and Pagano 1997, 2000; and DMS). Information sharing can be thought as a measure of creditor rights insofar as it helps creditors detect exposures and delinquencies at other banks and decrease borrowers' double-pledging and tunneling possibilities.

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 creditor rights characteristics. Overall, our sample includes 7,422 unique firms and 10,146 observations.[15] As can be observed in Table 1, the number of observations is not uniform across countries, varying from 1,811 in Korea to 86 in Sri Lanka. This raises concerns whether our findings are driven by one or two countries with a large number of observations. In the empirical analysis that follows, we carefully test and refute this possibility.

(Insert Table 1 about here)

Table 1 also reveals that there is a great deal of heterogeneity with respect to creditor rights in our sample. For example, in 6 of the 16 sample countries, the creditor rights index has values of 3 or 4, while for the remaining 10 countries, it has values of 2 or lower. In terms of observations, 54 percent of originations are from countries with a creditor rights index of 3 or 4. There is also substantial variation with respect to the individual components of the LLSV index—with the exception of *Secured Creditors First* that features in 75 percent of the countries in our sample. The

[15] 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.

strength of the *Collateral Law* index also varies significantly across the sample, with some countries having very high values (8 out of 8) and others having very low values (2 out of 8). Going beyond "rules in the books," we also observe substantial variation in the quality of law enforcement. Twenty-five percent of the sample countries have poor *Rule of Law* scores of 5 or below, while another 25 percent have high scores of 8 or higher. There is also substantial variation in *Contract Days,* with Singapore and Brazil at the two extremes of the spectrum. Similarly, each of the three enforcement procedures is equally represented in the sample. In terms of information sharing, about 44 percent of the countries have a public credit registry (*Public Registry*) in place, and 50 percent have a private credit bureau (*Private Bureau*).

The bottom part of the table provides information as to how representative our set of 16 countries is relative to a broader population of countries and the literature. In particular, in the last two rows of Table 1, we contrast our sample to the sample of 88 countries used in DHMS— the study closer to us. As can be observed in Table 1, the sample compares well with DHMS in terms of how well key aspects of creditor rights are represented in the sample. This is also in line with evidence provided in Liberti and Mian (2010), who replicated the main findings of the law and finance literature (LLSV and DMS) using a sample similar to ours.[16]

In Figure 1 we provide descriptive statistics for the average *RecoveryRate*—that is, the bank's expected recovery rates on collateral— at the country level plotted against creditor rights. The slope of this relation is positive and significant. A country-level regression of *RecoveryRate* on the creditor right index yields a coefficient of 0.097, which is statistically significant at the 5%-level. There is also reasonable cross-country variation of *RecoveryRate* (the country-level average is 0.85 and the standard deviation is 0.157), which ranges from 0.495 in low-creditor-rights country Brazil to 0.966 in high-creditor-rights Hong Kong.

[16] Relative to Liberti and Mian (2010), we additionally have data for India as well as fair market values and orderly liquidation values of collateral.

(Insert Figure 1 about here)

In Table 2 we probe deeper and examine how recovery rates vary by both asset class and creditor rights. We distinguish collateral types between *Movable* and *Non-Movable* collateral and classify countries based on their level of creditor protection using the LLSV index. Countries with a creditor rights index equal to 3 or higher are classified as high-creditor-rights (HCR) countries, while countries with values equal to 2 or lower are classified as low-creditor-rights (LCR) countries. The summary statistics are reported at the *borrower-asset class-time* level as is the regression analysis that follows. The last column of Table 2 indicates whether differences between *Movable* and *Non-Movable* collateral are statistically significant.

(Insert Table 2 about here)

In Panel A, we focus on all countries in the sample. The average expected recovery rate on collateral across all countries and types of collateral in our sample is 80.5 percent (i.e., on average the bank expects that 19.5 percent of the value of the pledged assets will be lost during enforcement). Distinguishing between collateral types reveals substantial variation in expected recovery between movable and immovable collateral. *Movable* collateral has on average much lower expected recovery rates (63.1 percent) than *Non-Movable* collateral (98.5 percent).

In Panel B, we additionally distinguish between HCR and LCR countries. The expected recovery rate is, on average, 17.2 percent lower in LCR countries. The spread in recovery rates across asset types is primarily present in LCR countries. In LCR countries, the average expected recovery rate on *Movable* collateral is 53.7 percent, while it is 98.3 percent for *Non-Movable* collateral, suggesting an average spread of –44.7 percent. In HCR countries, both *Movable* and *Non-Movable*

collateral have high expected recovery rates of 98.9 and 78.9 percent, respectively, suggesting an average spread of –20.0 percent. Comparing recovery rates across enforcement law and asset types, we find that the difference in recovery rates on movable and non-movable assets is –24.7 percent in LCR countries compared with HCR countries, consistent with weaker enforcement law being associated with lower liquidation values on movable assets.

Finally, not all types of collateral are equally represented in the two groups of countries. We find that *Movable* collateral is more frequently pledged in LCR countries (59 percent) than in HCR countries (50 percent). This implies that the types of collateral pledged may be constrained by supply-side factors (e.g., what borrowers have). The observed patterns also suggest that borrowers with less attractive collateral may be more frequent in LCR countries, suggesting that supply-side factors may be limiting banks' ability to overcome institutional weakness by requiring more attractive collateral in LCR countries. If the latter were the case, we would have been observing that *Non-Movable* collateral is more frequent in LCR countries.

II. Cross-Country Evidence

We start by providing first evidence on one of the mechanisms through which a law and institutions impact lending and real outcomes: their impact on the lender's expected recovery rates on collateral. In Figure 2 we show the unconditional correlation between loan-to-value (LTV) ratios and the expected recovery rate.[17] The correlation is positive and statistically significant suggesting that, in effect, expected recovery rates are an important channel through which better contract enforcement translates into lower loan-to-value ratios and higher debt capacity.[18] The figure also highlights that the

[17] The loan-to-value ratio is the loan value to the fair market liquidation value (FMV) of the pledged asset.

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

two measures do not perfectly coincide as loan-to-value ratios are also affected by additional factors such as the direct impact of institutions on default probabilities.

(Insert Figure 2 about here)

Next, in Table 3 we provide preliminary evidence on how recovery rates vary with country-level measures of enforcement. We employ *Creditor Rights* as our measure of enforcement, as it captures a broad set of laws and institutions that shift the bargaining power or control between borrowers and lenders in default. In particular, we estimate:

$$Recovery\ Rate_{k,i,c,t} = \alpha_t + \alpha_j + \beta_1 CreditorRights_c + \gamma_1 Controls_{c,t} + \gamma_2 Firm_{i,t} + \varepsilon_{k,i,c,t}. \quad (1)$$

$Recovery\ Rate_{k,i,c,t}$ 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_t, and α_j denote time and industry fixed effects, respectively. $CreditorRights_c$ is a (0, 1) dummy variable equal to one if the loan is in a HCR country and zero otherwise.[19] $Controls_{c,t}$ is a vector of time-varying country characteristics, including GDP per capita and legal origin. These controls aim to mitigate the concern that confounding country-level explanations drive any results on *Creditor Rights*. DHMS, among others, employ GDP per capita as a broad measure that captures economic and financial development, while the literature on law and finance finds that legal origin is a key determinant in both institutions and economic outcomes. In general, creditor rights are positively correlated with economic development and stronger in common-law countries. $Firm_{i,t}$ is a vector of time-varying firm characteristics at t, and includes the bank's internal risk rating, loan size, the bank's internal measure of firm size, the ratio of cash to total assets, the ratio of accounts receivable to total assets, the ratio of fixed assets to total assets, and the ratio of

[19] We prefer to use an indicator variable rather than the index itself to ease the economic interpretation of our coefficients and reduce possible measurement errors arising from ordinal variables. Results, throughout, are robust to using the continuous index itself.

inventory to total assets. These controls along with industry fixed effects control for variation in liquidation values owning to borrower composition. $\varepsilon_{k,i,c,t}$ is the idiosyncratic error term.[20]

(Insert Table 3 about here)

In column (1), the coefficient on *Creditor Rights* of 0.176 implies that, on average, liquidation values are 17.6 percent higher in HCR countries. In column (2), we include industry fixed effects to further control for borrower pool composition and find that the relation between creditor protection and recovery rates weakens marginally, implying that borrower composition explains some of the difference in liquidation values. For example, HCR countries might benefit from a higher quality borrower pool, which increases liquidation values.

In columns (3) and (4), we examine the importance of the individual creditor rights components. We find that *Secured Creditors First*, *No Automatic Stay*, and *Reorganization Restrictions* all matter for liquidation values. *Secured Creditors First* and *No Automatic Stay* directly affect the ability of a secured creditor to enforce her claim. *Reorganization Restrictions* protect the creditor from nonconsensual reorganization that might impair the value of the collateral. *Management Doesn't Stay*, which becomes insignificant once we control for economic development in column (4), describes whether creditors or management control operations through enforcement, which should be less important for enforcement of secured debt so long as the law states *Secured Creditors First* or *No Automatic Stay.*

III. Empirical Strategy

[20] 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 specifications (1) to (4) but cluster standard errors at the country-industry level. Results are stronger than clustering at the country level.

Cross-country regressions such as those presented in Table 3 are difficult to interpret as results may be influenced by omitted country characteristics. To address this challenge, we use a difference-in-differences approach that examines how the difference in recovery rates across movable and non-movable collateral varies with creditor rights. This approach allows us to introduce country-fixed effects, which absorb confounding country-level effects on the level of liquidation values.

Our identification strategy relies on the assumption that creditor rights affect enforcement and liquidation values on movable and non-movable collateral differentially in a manner that other country-level characteristics do not. In our baseline specifications, omitted factors are assumed to affect movable and immovable collateral equally. We relax this assumption in subsequent specifications. We begin by estimating the following model:

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

$Recovery\ Rate_{k,i,c,t}$ 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 t. $\varepsilon_{k,i,c,t}$ is the idiosyncratic error term.

Estimates of β_1 measure the average differences in expected recovery rates between movable and non-movable collateral and are obtained using only *within-country* variation. Time and industry fixed effects control additionally for time- and industry-specific effects (e.g., business cycle conditions, differences in available collateral across industries). Further, in some specifications we

include country-industry-time fixed effects to absorb time-varying economic shocks specific to a local industry in single country. We expect that, on average, the bank's expected recovery rates on movable collateral are lower than on non-movable collateral, pointing to a negative β_1. We refer to β_1 as the average *within-country spread* in recovery rates.

To examine the impact of creditor rights on the bank's expected recovery rates on collateral, we compare this within-country spread between countries with weak and strong creditor rights using:

$$Recovery\ Rate_{k,i,c,t} = \alpha_c + \alpha_t + \alpha_j + \beta_1 Movable_k + \beta_2 Movable_k \times Creditor\ Rights_c + \gamma_1 Firm_{i,t} + \varepsilon_{k,i,c,t}. \quad (3)$$

$Creditor\ Rights_c$ is a dummy variable indicating strong creditor rights, which is our benchmark measure of enforcement. To better understand how different aspects of laws and institutions influence liquidation values, in subsequent specifications, we also study the debt enforcement procedures outlined in DHMS, collateral enforcement law, and information sharing.

The coefficients of interest in this model are β_1 and β_2, again identified using within-country variation across collateral types. β_1 measures the difference in expected recovery rates between movable and immovable collateral in weak-creditor-rights countries. β_2 measures the difference in expected recovery rates between movable and non-movable collateral in strong creditor rights countries, relative to weak-creditor-rights countries. As in equation (2), 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. β_2 represents the conditional counterpart of the unconditional difference-in-differences estimate at the bottom of Table 2.

The estimation of β_2 provides us with an estimate of the differential impact of creditor rights on movable and immovable collateral that is not affected by confounding differences across countries.

However, there are two important concerns with this approach. First, it is possible that omitted country characteristics also affect liquidation values on movable and non-movable collateral differently. Second, it is possible that omitted factors *within* a country threaten the internal validity of our estimates—that is, borrowers that pledge movable and non-movable collateral within the same country may differ in some unobservable way that explains differences in liquidation values.

To address the first concern, we allow for omitted country characteristics to affect movable and non-movable collateral differently. As before, we include each country's economic development, measured as the GDP per capita, but now interact this with collateral type. While GDP per capita correlates with factors we aim to study (i.e., richer countries have stronger creditor rights), it also correlates with many other country characteristics that may affect liquidation values on pledged assets—institutional or not. Introducing an interaction between movable collateral and GDP per capita allows us to study whether such factors affect movable and immovable collateral differently.

To address the second concern, we exploit the within-borrower variation across different types of collateral. This allows us to estimate the difference in liquidation values across collateral types for the same borrower and then contrast how this within-borrower difference varies across creditor rights by employing a borrower-fixed effects (α_i) framework:

$$Recovery\ Rate_{k,i,c,t} = \alpha_i + \alpha_t + \beta_1 Movable_k + \beta_2 Movable_k \times Creditor\ Rights_c + \gamma_1 Firm_{i,t} + \varepsilon_{k,i,c,t}. \quad (4)$$

A final concern in estimating (4) is that systematic differences in firm composition across countries could still bias our estimates if firm characteristics affect movable and immovable collateral differently. For example, if borrowers that pledge both movable and non-movable collateral in weak-law countries tend to be riskier than borrowers that pledge both collateral types in strong-law

countries, and risk affects liquidation values on movable collateral, this may lead us to overestimate the impact of creditor rights on the bank's expected recovery rates. To address this concern, we allow for interactions between movable collateral and key firm characteristics such as firm risk and asset specificity. In our last sets of specifications, we also allow for triple interactions with selected creditor rights indicators. Such interactions can help uncover where the source of inefficiency lays.

IV. Results

a. Expected Recovery Rates and Enforcement

Table 4 presents our baseline results. We begin in column (1) by comparing the bank's expected recovery rates on movable and immovable collateral across all countries. Our estimates suggest that the bank's expected recovery rates on movable collateral are on average 30.2 percentage points lower than on immovable collateral, controlling for country fixed effects, industry effects, and borrower characteristics.

(Insert Table 4 about here)

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

Comparisons of the estimates in Table 4 with the univariate difference in differences of 24.7 percent in Table 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 expected recovery rates on movable collateral by around 57 percent (0.307/0.537). Similar results are obtained in column (3) where we use country-industry fixed effects.

To further examine whether omitted country characteristics threaten the internal validity of our estimates, we also allow for an interaction between movable collateral and GDP per capita. If omitted country characteristics affect movable and immovable collateral differently, our difference-in-differences approach will not completely eliminate biases arising from such factors. To proxy for such characteristics, we use a country's *GDP per Capita* and interact this with *Movable* in column (4). The coefficient of the interaction between *Movable* and *Creditor Rights* (our key coefficient) remains positive and statistically significant. Its size is somewhat smaller, which is expected given the positive correlation between GDP per capita and creditor rights.[21] The coefficient of the interaction term with GDP per capita is statistically insignificant and close to zero, suggesting that omitted country characteristics are unlikely to affect movable and immovable collateral differently.

In column (5), we push identification a step further by replacing the country-industry fixed effects with *borrower* fixed effects. This specification absorbs possible confounding factors not only across countries but also *within* a country, and is our main specification in all following tests. The sample size reduces from 10,146 to 4,744 because, as presented in Table 1, only 2,022 borrowers pledge multiple collateral types in 4,744 observations. Results are qualitatively unchanged. In terms of size, our estimate is slightly larger in absolute than those reported earlier: 33.5 percentage points as

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

opposed to 30.7 and 30.0 percentage points in columns (2) and (3). Finally, in column (6) we introduce country-industry-time fixed effects to absorb local economic fluctuations that might explain within borrower variation in liquidation values through time. The main results continue to hold.

The fact that the impact of creditor rights is larger in within-borrower estimations than for within-country estimations implies that examining the spread across borrowers underestimates the effect of creditor rights on recovery rates. One explanation for this is that on average borrowers that pledge movable collateral are systematically different from those that pledge non-movable collateral in weak-law countries compared with strong-law countries. For example, it is possible that in weak-law countries, the bank accepts movable collateral from only the best quality borrowers, for whom agency issues are less of a concern. Nevertheless, our estimates suggest that biases arising from such factors are relatively small. Comparisons with Table 2 and earlier estimates in Table 4 suggest that failing to account for possible confounding factors at the country and borrower levels underestimates the impact of creditor rights by around 0.356 percent ((0.335-0.247)/0.247)— 11.6 percentage points more than in column (1), where we only control for country fixed effects.

Table 1 showed that some countries had a substantially larger number of observations than other countries. Hence, to examine whether our findings are driven by one or two countries with a large number of observations, in unreported regressions we collapse the number of observations at the country-level, retaining one observation per country. Results remain unaffected.[22]

Overall, results in Table 4 indicate that our key insights from Table 2 are maintained in a regression framework that controls for possible confounding factors. We find that creditor rights have a much larger impact on the liquidation values of movable rather than immovable collateral,

[22] In particular, we first run 16 country-level regressions of equation (2). 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".

particularly in weak-creditor-rights countries. The remaining empirical analysis seeks to understand why this is the case.

In Tables 5 and 6, we study the enforcement laws and institutions that govern creditors' bargaining power and control rights in default, characterized by "rules in the books," efficiency of enforcement in practice, and information-sharing mechanisms, to shed light on how enforcement shapes recovery rates. In Table 5, we provide pairwise correlations for laws and institutions that might affect recovery rates, and in Table 6 we present estimation results.

We first focus on the enforcement procedures outlined in DHMS: foreclosure, liquidation, and reorganization. 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. They then studied how each procedure correlates with measure of enforcement efficiency and other structural characteristics that govern enforcement. They found that foreclosure works extremely well when combined with a "floating charge" on the firm and an out-of-court enforcement (i.e., when creditors are allowed to enforce their claim in an out-of-court procedure and seizure and sale of collateral is allowed out-of-court). Consistent with DHMS, pairwise correlations in Table 5 indicate that foreclosure is more likely used in countries where a floating charge and out-of-court enforcement are feasible and they are all associated with higher expected recovery rates on collateral (i.e., correlations between *Foreclosure*, *Floating Charge*, *Out-of-Court*, *No Judg. for Enforcement,* and *OLV/FMV* are positive).

(Insert Table 5 about here)

In Table 6, we evaluate the impact of these procedures on the bank's expected recovery rates on movable and immovable collateral using our difference-in-differences approach with borrower

fixed effects. Summarizing the results in columns (1) and (2), countries where foreclosure and out-of-court enforcement are feasible, the estimated within-borrower differences in expected recovery rates between movable and immovable collateral are systematically smaller.[23] The differences are quite sizable. The estimated within-borrower spread is –42 percentage points in countries where liquidation is more likely, as opposed to only –15.5 percentage points in countries where foreclosure is more likely—a sizable difference of 26.5 percentage points. No judgment for enforcement and out-of-court seizure and sale of collateral are associated with smaller within-borrower spreads by 15 and 10.1 percentage points each.

(Insert Table 6 about here)

Next, we explore the role of movable collateral laws, using data from the World Bank's Doing Business legal rights index. The index covers three aspects of the movable collateral law: creation, monitoring, and enforcement. Features relating to creation determine the scope of movable assets that can be pledged as collateral: monitoring describes whether creditors can ensure that other lenders do not have security rights over the same assets, and enforcement indicates whether the law allows parties to contractually agree to out-of-court enforcement for movable collateral.

Using the available information, we build three indicators: *Collateral Creation*, *Collateral Registry*, and *Collateral Enforcement*.[24] *Collateral Creation* equals one if a country's cumulative

[23] The number of observations in columns (1), (9) and (10) gets reduced to 3,336 since we do not have procedures for India and Pakistan.

[24] Construction of the index follows Calomiris, Larrain, Liberti, and Sturgess (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

score with respect to creation is equal or greater than the sample median, and zero otherwise. *Collateral Registry* equals one when there is an electronic collateral registry for security interests on movable property, unified geographically and by asset type, and zero otherwise. *Collateral Enforcement* equals one when out-of-court enforcement is possible, and zero otherwise.

Pairwise correlations in Table 5 indicate that countries where the scope of using movable assets as collateral is high also exhibit the existence of a registry and out-of-court enforcement. These are also countries where creditor and enforcement rights tend to be stronger. 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. Within-borrower estimates in columns (3)–(6) of Table 6 indicate that expected recovery rates on movable collateral relative to immovable collateral are substantially higher in countries with stronger movable collateral laws. Among the three indicators, *Collateral Enforcement* is most powerful, both statistically and economically. *Collateral Enforcement* is associated with smaller estimated absolute spreads by a factor of three (–48.1 as opposed to –16.3 percentage points). *Collateral Creation* and *Collateral Registry* are associated with smaller absolute spreads by a factor of two.

Next, we study how the bank's expected recovery rates on movable and immovable 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 Table 5 indicate that countries with inefficient courts tend to have lower expected recovery rates on collateral, have weaker creditor

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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.

rights, and are less likely to enable out-of-court enforcement of security interests. Estimates in Table 6 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.

We also explore the role of public credit registries and private credit bureaus. We use a dummy variable, *Information Sharing*, to indicate whether a public credit registry or a private credit bureau is operational, taken from Djankov, McLiesh, and Shleifer (2007). Information-sharing institutions collect information on the standing of borrowers in the financial system and make the data available to financial institutions facilitating the screening and monitoring of borrowers (see, e.g., Jappelli and Pagano 1993 and Padilla and Pagano 1997, 2000). Information sharing can be thought as a measure of creditor rights insofar as it helps creditors detect exposures and delinquencies at other banks and decrease borrowers' double-pledging and tunneling possibilities. Pairwise correlations in Table 5 indicate that information sharing is not significantly correlated with any other indicators. Estimation results in Table 6 indicate that expected recovery rates on movable collateral relative to immovable collateral are 27.9 percentage points higher when information sharing is present.

Finally, we examine how each of the enforcement components we study in Table 6 compare with our main measure, creditor rights, in explaining variation in recovery rates. In columns (9) and (10), we first estimate recovery rates including interactions of *Foreclosure, Collateral Enforcement*, *Contract Days*, and *Information Sharing* with *Movable*, and then introduce the interaction of *Creditor Rights* with *Movable.* Efficient enforcement of contracts, in terms of both procedure and timing, are particularly important in explaining variation in recovery rates in addition to creditor rights that protect creditors' bargaining power.

b. Expected Recovery Rates and Borrower Characteristics

In Table 7, we focus on borrower characteristics that may affect recovery rates on movable and non-movable collateral differentially. In particular, we examine specificity, or redeployability, of a borrower's assets; borrower risk; creditor coordination costs; and trade credit.

Less redeployable assets might exhibit lower liquidation values simply because they have fewer alternate uses. Weaker enforcement, however, may exacerbate this problem for a couple of reasons. First, if assets are most valuable in their current use, then incumbent managers have more bargaining power in any dispute. Second, weaker enforcement increases the time to enforcement and assets may become obsolete as time passes, further exacerbating the negative impact of few alternative uses. We identify redeployability using asset specificity at the industry level, following Stromberg (2000) and Acharya, Bharath, and Srinivasan (2007). We measure an industry's asset specificity as the median book value of the industry's "machinery and equipment + inventories" divided by the book value of total assets. We rely on U.S. Compustat data for two-digit sectors for the period 1984–1996 to create an *Asset Specificity* dummy equal to one when asset specificity is above the median and zero otherwise.[25] Results in column (1) show that recovery rates for movable assets are lower in industries with high asset specificity, but this does not explain the variation across strength of enforcement.

Next, we examine borrower risk. The bank may expect lower recovery rates on movable assets for riskier borrowers because of greater agency concerns, or if borrower risk reflects asset quality. The internal credit rating assigned to each borrower by the bank is a letter-grade from A (best) to D (worst). We define *Rating* as a numerical variable that takes a value of 1 to 4, respectively. We find a negative coefficient on *Movable* × *Rating*, consistent with this, but once again our main results hold.

(Insert Table 7 about here)

[25] We rely on the 1984–1996 period, as Compustat only allows us to measure machinery equipment from property for that period.

Enforcement is simpler and quicker when there is a single creditor. Consequently, laws that impede efficient enforcement of debt contracts are likely less effective as the number of creditors and coordination problems increase. Unfortunately, we do not observe the number of creditors, but do observe the total liabilities of the borrower, both short term and long term, as a fraction of total assets. This variable includes not only other debt but also accounts payable and tax liabilities. We predict that as the ratio of total liabilities to total assets increases, coordination problems among creditors increase, and laws that limit enforcement of secured debt become costlier for expected liquidation values on movable assets. In column (3), we show that the spread in recovery rates across movable and non-movable assets within a borrower is greater for borrowers that are likely to have more creditors.

In column (4), we focus on the level of trade credit, which we measure as the ratio of accounts receivables to total assets for each borrower. Trade credit has two implications for movable collateral. First, it is a significant source of movable collateral. Second, trade credit complicates enforcement both directly in so much that the borrower's assets are a claim on a second firm's cash flows, and indirectly by increasing borrower liquidity requirements. Consistent with this, we show that borrowers with greater levels of trade credit exhibit lower liquidation values on movable collateral.[26]

In Table 8, we expand further on the roles of asset redeployability, borrower risk, liabilities, and trade credit by examining if the effect of these on movable recovery rates is due to weak enforcement. To disentangle the effects, we focus on two components of enforcement shown to be important for recovery rates in Table 6, procedure and time.

(Insert Table 8 about here)

[26] For a theoretical underpinning of the relation between trade credit and liquidation values see Fabbri and Menichini (2010). Giannetti, Burkart, and Ellingsen (2011) provide empirical evidence that trade credit is also associated with the nature and deployability of the transacted goods.

We find that the negative effects of asset redeployability, borrower risk, creditor coordination, and trade credit on movable recovery rates are dampened significantly in economies with efficient enforcement procedure that allows for out-of-court enforcement such as foreclosure (columns (1), (3), (5), and (7)). This is consistent with the interpretation that asset specificity and borrower risk aggravate agency concerns and that greater liabilities and trade credit complicate enforcement in the absence of procedures that protect secured debt interests. Similarly, we find that the negative effects of asset redeployability, borrower risk, and creditor coordination on movable recovery rates increase with the time of enforcement (columns (2), (4), (6), and (8)).

Taken together, the results in Tables 6, 7, and 8 provide evidence that weak enforcement affects negatively the recovery rates on movable collateral, that procedures such as out-of-court settlement and time to enforcement are particularly important, and that certain borrowers are prone to greater within-borrower spreads in recovery rates in weak-law countries. Importantly, however, the within-borrower spreads in recovery rates across creditor rights that we document cannot be explained by differences in country and borrower characteristics across countries.

c. Expected Recovery Rates and Movable Collateral Types

The results in Tables 7 and 8 show that the within-borrower spread on recovery rates across movable and non-movable assets is greater for riskier firms and firms with less redeployable assets. In Table 9, we further examine how agency concerns and redeployability shape expected recovery rates by opening up movable collateral to its constituent parts, accounts receivables, equipment, and specific assets including inventory.

The degree to which debtors have more bargaining power in default will depend on their ability to influence asset values and divert assets, which likely varies across asset types. For example, the value of specific assets such as inventory may be tied to the manager or the firm because the asset depreciates quickly, becomes obsolete, is not redeployable, requires the firm's sales distribution

channel, and may be easy to divert.[27] On the other hand, equipment such as commercial vehicles should be more redeployable, while accounts receivable are owed by a third party, so they may be harder to enforce but less prone to agency concerns.

(Insert Table 9 about here)

In Table 9, we re-estimate (4) to examine how expected recovery rates vary across movable collateral types and creditor rights in a borrower fixed effects framework. Specific assets and accounts receivable exhibit the greatest recovery rates discount compared with non-movable assets (65 and 40 percentage points, respectively, in column (1)). Further, when comparing across enforcement law, we find that the expected recovery rate on specific assets, in particular, is sensitive to the strength of creditor protection. Results in column (2) show that the expected recovery rate on specific assets is 51 percentage points lower than for non-movable assets in weak-creditor-rights countries, but only 14 percentage points lower than for non-movable assets in weak-creditor-rights countries.

In columns (3) and (4), we examine the effects of enforcement procedure and time to enforcement, motivated by DHMS and our results in Tables 6–8. In general, we find similar results as for creditor protection. Expected recovery rates for specific assets are most sensitive to both procedures that allow for out-of-court enforcement and timeliness of enforcement. However, recovery rates for accounts receivable are also affected by enforcement procedure. The recovery rate on accounts receivables is approximately half in economies that do not allow foreclosure compared with countries that do, compared with recovery rates on non-movables for the same borrower. One explanation for this might be that foreclosure, typically found in common-law countries, rarely allows for a floating lien on a pool of assets (such as inventory and accounts receivables) and even where it does, it generally requires the use of a court-appointed receiver to foreclose on collateral that is not in

[27] For example, debtor bargaining power might be higher where a firm's product is typically sold with a warranty that requires ongoing service (e.g., cars as inventory), or if the product is seasonal (e.g., clothing).

the secured lender's possession (such as accounts receivables). Consequently, unlike under the UCC in the United States or economies with well-developed collateral law, a secured creditor may have no control over disposition of its collateral, and may also suffer significant delays in receiving proceeds.[28]

Overall, results suggest a collateral pecking order whereby creditors, aware of enforcement frictions not only with movable collateral but also across types of movable collateral, assign lower expected recovery rates to specific assets where values are most likely to be adversely affected by financial distress.

d. Loan Contracting

In Table 10 we investigate whether expected recovery rates on collateral are reflected in the interest rates charged to borrowers. As described earlier, the sample of borrowers that pledge both collateral types is formed of borrowers that pledge movable and non-movable collateral at the same time, against the same loan, and those that pledge movable and non-movable collateral against two distinct loans. To study the relation between recovery rates and interest rates, we focus on the second group, which allows us to examine how interest rates vary with recovery rates within borrower. We drop instances where a borrower pledges multiple assets against a single loan because interest rates are observed at the loan level, and therefore we are unable to identify differences in interest rates across collateral types within the same borrower when multiple collateral types support the same loan. This leaves us with 1,350 of the original 4,744 observations.

In panel A, we present descriptive statistics for interest rates. This rate is the net spread—that is, the gross interest rate charged plus all fees on the loan minus the marginal cost of lending.

[28] We do not believe that accounts receivable pledged to our bank are part of a factoring program. Klapper (2007) succinctly explains that "factoring is explicitly linked to the value of a supplier's accounts receivable and receivables are sold, rather than collateralized, and factored receivables are not part of the estate of a bankrupt firm." Since accounts receivables are sold, rather than pledged, to a lender, recovery rates are not dependent on local enforcement procedure or collateral law.

Examining differences across collateral and enforcement law, interest rates are 55.4 basis points higher on movable loans and 72.3 basis points lower in countries with stronger enforcement. In difference-in-differences, rates are 66.6 basis points higher on movable loans than non-movable loans in weak-law countries compared with strong-law countries.

(Insert Table 10 about here)

Next, we explore whether these differences in interest rates are also present in a conditional framework with firm fixed effects. Before turning to the interest rate regressions, in Panel B of Table 10, we confirm that the expected recovery rates in the subsample of 1,350 observations vary across economies and collateral in the same way as for the full sample, reported in Table 2.

In panel C we report estimates of interest rate regressions with borrower fixed effects in a framework similar to equation (4). In column (1) we find that interest rates are, on average, 31.8 basis points higher on loans supported with movable collateral than for loans supported with non-movable collateral. This comparison is made for the same borrower pledging two loans, controlling for borrower and time fixed effects and changes in loan and borrower characteristics, and thus free from unobserved heterogeneity issues that generally plague tests of the empirical relation between collateral and interest rates. In column (2) we introduce creditor rights. The positive rate spread on movable collateral documented is 72.4 basis points in weak-enforcement countries but zero in strong-enforcement countries (the sum of 0.724 and –0.849 is insignificant). This result implies that the negative relation between liquidation values and credit spreads, as shown in Benmelech and Bergman (2009), is a feature of economies with weak enforcement law. One interpretation is that banks adapt the loan contract to overcome weak enforcement laws. In column (3), we examine the relation between interest rates and expected recovery rates directly. We find a negative, statistically and economically significant relation between recovery rates and interest rates.

e. Expected and Actual Recovery Rates

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.[29] 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 3 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 3 about here)

In Figure 4 we also plot the relation between the expected recovery rates on collateral and the actual recovery rates on loans. If the lender prices weak enforcement into lending decisions through the expected recovery rate on collateral, then lower expected recovery rates should result in lower loan-to-value ratios, as shown in Figure 2, but not necessarily lower recovery rates on loans. We find this is the case. This suggests that banks are able to overcome inefficiencies in the legal and institutional environment through private contracting—admittedly not without consequences to the borrowers, consistent with insights from the law and finance literature.

(Insert Figure 4 about here)

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

V. Concluding Remarks

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

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

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

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

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

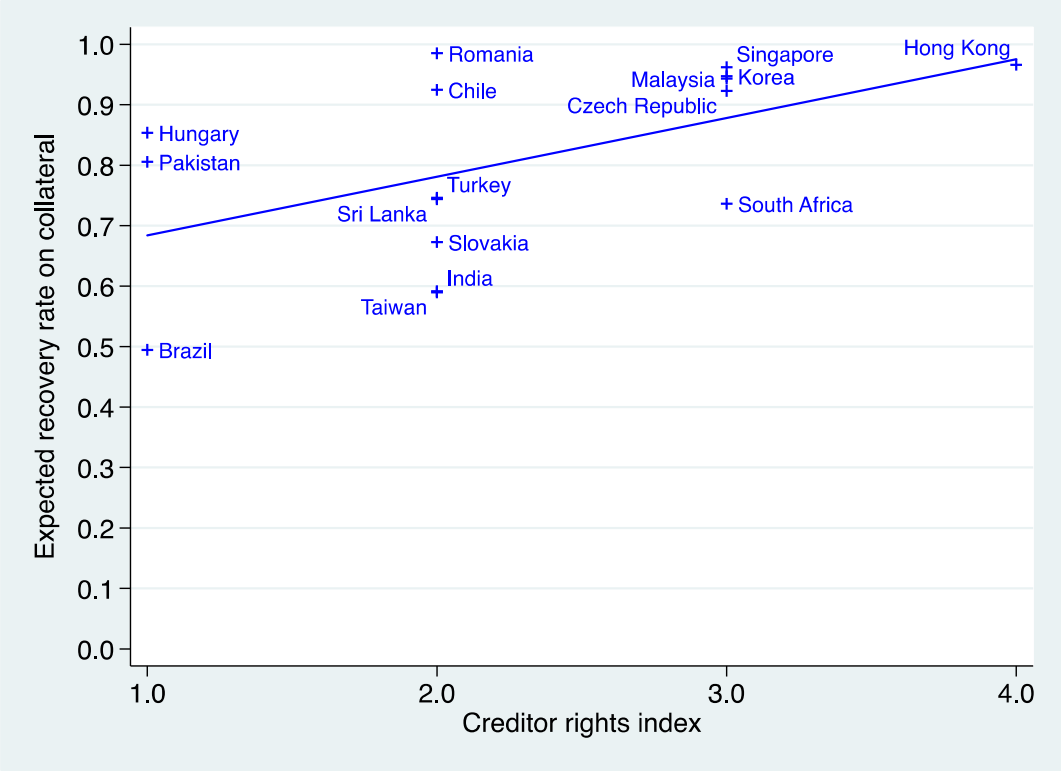


Figure 2
Loan-to-Value and Expected Recovery Rates: Country-level Evidence

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

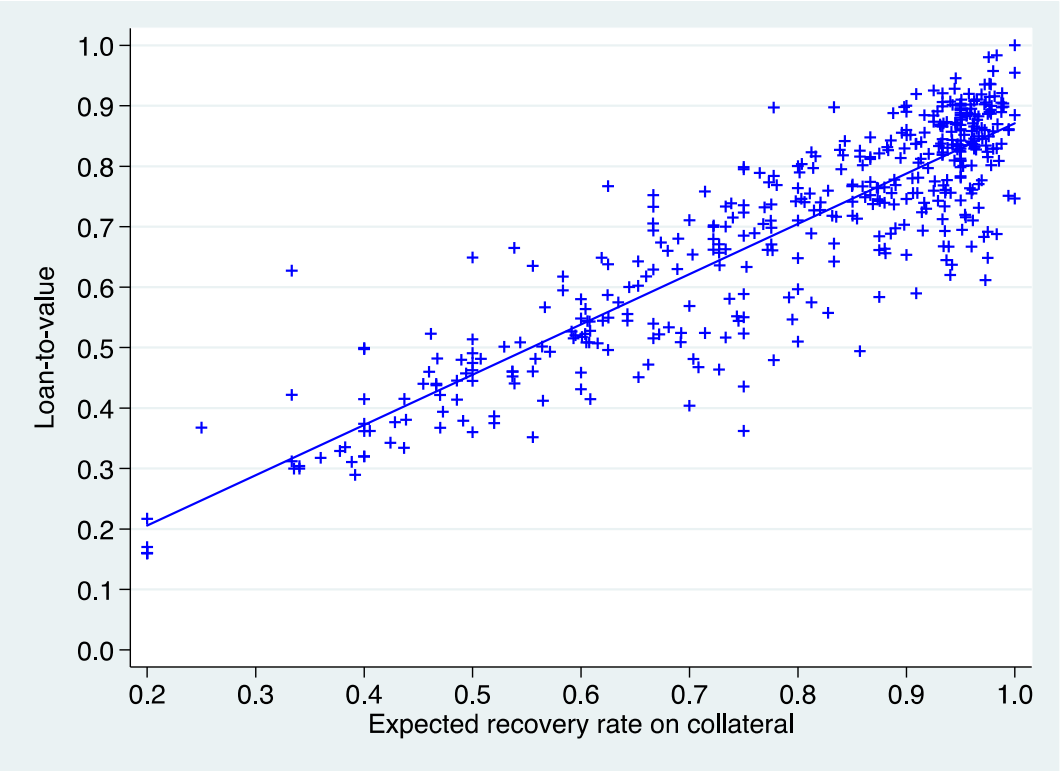


Figure 3
Actual Recovery Rates on Collateral and Expected Recovery Rates on Collateral: Country-level Evidence

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.

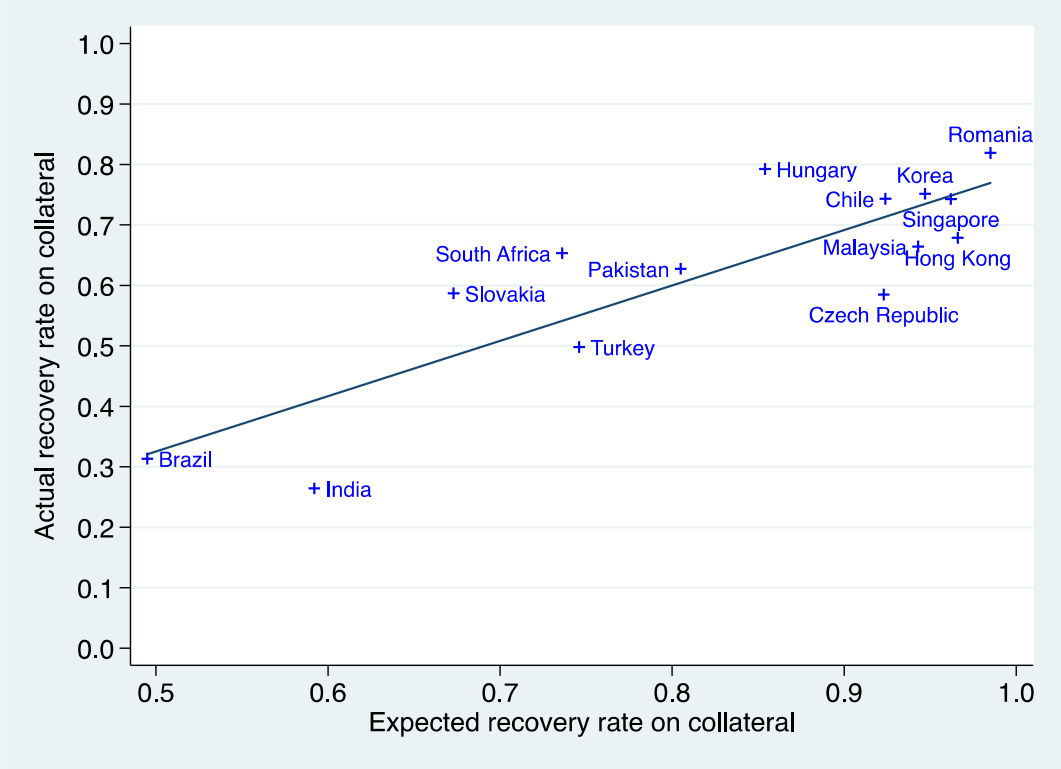


Figure 4
Actual Recovery Rates on Loans and Expected Recovery Rates on Collateral: Country-level Evidence

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.

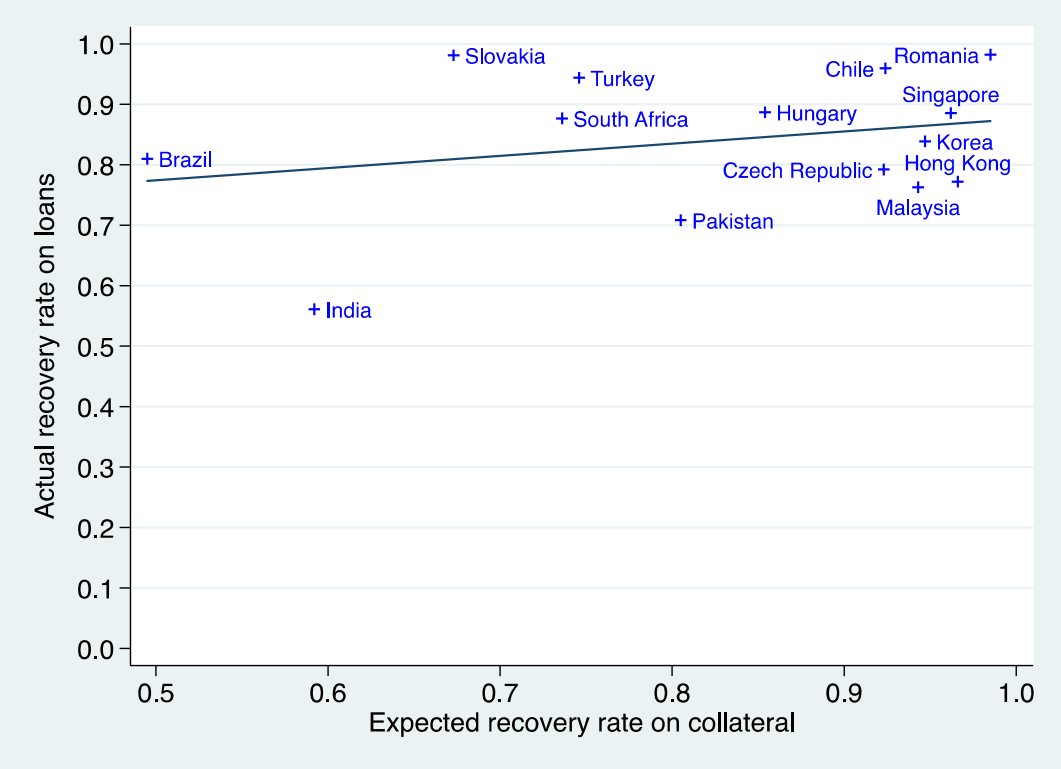


Table 1
Data Description by Country and Sample Comparison with DHMS

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						Quality of Enforcement in Practice					Information Sharing	
					DMS					DB	LLSV	DLLS	DHMS			DMS	
	All Borrowers		Multiple Assets										Enforcement Procedure				
Country	# Obs	# Firms	# Obs	# Firms	LLSV Index	Reorganization Restrictions	No Automatic Stay	Secured Creditors First	Management Doesn't Stay	Collateral Law Index	Rule of Law	Contract Enforcement Days	Foreclosure	Reorganization	Liquidation	Public Registry	Private Bureau
	(1)	(2)	(3)	(4)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
1 Brazil	201	201			1	0	1	0	0	2	6.32	566	0	0	1	1	1
2 Chile	442	348	154	60	2	0	1	1	0	3	7.02	305	1	0	0	1	1
3 Czech	674	631	86	43	3	0	1	1	1	5	8.33	300	0	0	1	1	1
4 Hong Kong	1,404	1,277	254	127	4	1	1	1	1	8	8.22	211	1	0	0	0	0
5 Hungary	342	227	194	79	1	1	0	0	0	6	6.67	365	1	0	0	0	1
6 India	1,379	602	1,182	405	2	1	0	1	0	5	4.17	425				0	0
7 Korea	1,811	1,213	1,176	578	3	0	1	1	1	6	6.67	75	0	1	0	0	1
8 Malaysia	773	627	272	126	3	1	1	1	0	8	6.78	300	0	0	1	1	1
9 Pakistan	256	96	226	66	1	0	0	1	0	5	3.03	395				1	0
10 Romania	154	134	39	19	2	0	1	1	0	6	6.67	335	0	1	0	0	0
11 Singapore	276	241	67	32	3	0	1	1	1	8	8.57	69	1	0	0	0	0
12 Slovakia	275	157	191	73	2	0	1	1	0	8	6.67	565	0	0	1	1	0
13 South Africa	551	395	286	130	3	1	0	1	1	8	4.42	277	0	0	1	0	1
14 Sri Lanka	86	86			2	1	0	0	1	2	5.00	440	1	0	0	0	1
15 Taiwan	426	373	105	52	2	0	0	1	1	3	8.52	210	0	1	0	1	1
16 Turkey	1,096	814	512	230	2	1	1	0	0	3	5.18	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	6.39	323	0.36	0.29	0.36	0.44	0.50
DHMS sample					2.01	0.33	0.42	0.71	0.57	4.49	6.85	381	0.28	0.42	0.30	0.49	0.59

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. *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. *Non-Movable* 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 non-movable 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 non-movable and movable collateral, and report the difference in recovery rates across non-movable 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 and Creditor Rights: Cross-Country Evidence

This table presents OLS estimates of equation (1). The dependent variable is the bank's expected recovery rate on collateral. *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. Columns (3) and (4) present results using the four components of the creditor rights index: *Reorg. Restrictions*, *No Automatic Stay*, *Secured Creditors First*, and *Management Doesn't Stay* are dummy variables equal to one when a country has this creditor right, and zero otherwise. Tables A1 and A2 in the Appendix provide definitions and descriptive statistics for all variables, including the firm characteristics used as controls. ***, **, * indicate statistical significance at the 1, 5, and 10 percent levels. Standard errors are reported in parentheses and are clustered at the country level.

	Expected Recovery Rate			
	(1)	(2)	(3)	(4)
Creditor Rights	0.176***	0.159***		
	(0.050)	(0.050)		
Reorg. Restrictions			0.103***	0.100**
			(0.033)	(0.037)
No Automatic Stay			0.205***	0.147**
			(0.040)	(0.060)
Secured Creditors First			0.162***	0.157***
			(0.041)	(0.042)
Management Doesn't Stay			0.060**	-0.006
			(0.026)	(0.060)
Log GDP per Capita	0.046***	0.050***		0.036
	(0.015)	(0.015)		(0.029)
French Legal Origin	0.081	0.050		
	(0.047)	(0.046)		
German Legal Origin	-0.013	-0.029		
	(0.025)	(0.028)		
Firm Composition				
Firm Ratings	Included	Included	Included	Included
Loan Size	Included	Included	Included	Included
Firm Size	Included	Included	Included	Included
Balance Sheet Data (4 Ratios)	Included	Included	Included	Included
Fixed Effects				
Time	Included	Included	Included	Included
Industry		Included	Included	Included
Observations	10,146	10,146	10,146	10,146
R-squared	0.20	0.21	0.27	0.27

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

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

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

Table 5
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	Liquidation	Floating Charge	Out of Court	No Judgement for Enforcement	Log Contract Days	Collateral Creation	Collateral Registry	Collateral Enforcement	Information Sharing
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										
Liquidation	-0.111	0.386	-0.051	-0.444	-0.365	1.000								
	0.719	0.193	0.870	0.128	0.220									
Floating Charge	0.606	0.386	0.462	0.639	-0.365	-0.083	1.000							
	0.028	0.193	0.112	0.019	0.220	0.787								
Out of Court	0.482	0.461	0.578	0.640	-0.234	-0.284	0.640	1.000						
	0.095	0.113	0.039	0.019	0.443	0.347	0.019							
No Judgement for Enforcement	0.451	0.225	0.540	0.822	-0.300	-0.365	0.822	0.779	1.000					
	0.122	0.459	0.057	0.001	0.319	0.220	0.001	0.002						
Log Contract Days	-0.612	-0.600	-0.633	-0.270	-0.356	0.333	-0.275	-0.535	-0.350	1.000				
	0.026	0.030	0.020	0.372	0.232	0.267	0.364	0.060	0.242					
Collateral Creation	0.472	0.720	0.345	0.278	-0.365	0.278	0.639	0.640	0.426	-0.351	1.000			
	0.103	0.006	0.248	0.358	0.220	0.358	0.019	0.019	0.147	0.239				
Collateral Registry	0.481	0.537	0.367	0.501	-0.433	0.158	0.843	0.539	0.693	-0.239	0.843	1.000		
	0.096	0.059	0.218	0.081	0.139	0.606	0.000	0.057	0.009	0.431	0.000			
Collateral Enforcement	0.525	0.415	0.321	0.185	0.058	-0.158	0.527	0.337	0.433	-0.500	0.527	0.625	1.000	
	0.066	0.159	0.284	0.546	0.851	0.606	0.064	0.260	0.139	0.082	0.064	0.022		
Information Sharing	0.128	-0.033	0.124	-0.178	0.234	0.284	-0.178	-0.409	-0.273	0.286	-0.178	-0.101	0.101	1.000
	0.677	0.915	0.686	0.561	0.443	0.347	0.561	0.165	0.368	0.344	0.561	0.742	0.742	

Table 6
Spread in Recovery Rates and Creditor Rights: Going Beyond Creditor Rights

This table presents OLS estimates of an augmented version of equation (4) 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 definitions and descriptive statistics for all variables, including the firm characteristics used as controls. ***, **, * indicate statistical significance at the 1, 5, and 10 percent levels. Standard errors are reported in parentheses and are clustered at the country level.

	Expected Recovery Rate									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Movable	-0.420***	-0.375***	-0.389***	-0.399***	-0.481***	-0.481***	-0.262***	-0.526***	-0.430***	-0.393***
	(0.077)	(0.078)	(0.079)	(0.080)	(0.042)	(0.042)	(0.043)	(0.009)	(0.032)	(0.045)
Movable × Foreclosure	0.265***								0.104*	0.151**
	(0.082)								(0.055)	(0.063)
Movable × Reorganization	0.139									
	(0.162)									
Movable × No Judgement for Enforcement		0.150*								
		(0.078)								
Movable × Out of Court Seizure and Sale		0.101***								
		(0.006)								
Movable × Collateral Creation			0.217**			0.036				
			(0.100)			(0.061)				
Movable × Collateral Registry				0.220**		-0.060				
				(0.096)		(0.066)				
Movable × Collateral Enforcement					0.318***	0.335***			0.142	
					(0.058)	(0.077)			(0.090)	
Movable × Log Contract Days							-0.278***		-0.156***	-0.139**
							(0.065)		(0.042)	(0.053)
Movable × Information Sharing								0.279***	0.080	
								(0.068)	(0.074)	
Movable × Creditor Rights										0.198*
										(0.093)
Firm Ratings	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Loan Size	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Firm Size	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Balance Sheet Data (4 Ratios)	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Fixed Effects										
Borrower	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Time	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Observations	4,744	4,744	4,744	4,744	4,744	4,744	4,744	4,744	4,744	4,744
R-squared	0.68	0.68	0.68	0.68	0.68	0.70	0.68	0.69	0.71	0.71

Table 7
Spread in Recovery Rates and Creditor Rights: Agency Problems and Asset Specificity

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

	Expected Recovery Rate			
	(1)	(2)	(3)	(4)
Movable	-0.406***	-0.414***	-0.437***	-0.439***
	(0.061)	(0.056)	(0.049)	(0.050)
Movable × Creditor Rights	0.322***	0.333***	0.320***	0.329***
	(0.068)	(0.063)	(0.064)	(0.063)
Movable × Asset Specificity	-0.061**			
	(0.027)			
Movable × Rating		-0.086*		
		(0.044)		
Movable × Liabilities/Assets			-0.035**	
			(0.016)	
Movable × Trade Credit				-0.366**
				(0.125)
Firm Ratings	Included	Included	Included	Included
Loan Size	Included	Included	Included	Included
Firm Size	Included	Included	Included	Included
Balance Sheet Data (4 Ratios)	Included	Included	Included	Included
Fixed Effects				
Borrower	Included	Included	Included	Included
Time	Included	Included	Included	Included
Observations	4,744	4,744	4,744	4,744
R-squared	0.70	0.70	0.70	0.70

Table 8
Expected Recovery Rates and Enforcement Procedure

This table presents OLS estimates of augmented versions of equation (4) that examine how the effect of borrower type on recovery rates varies with enforcement. 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 equals zero otherwise. *Enforcement* is either a dummy variable indicating that *Foreclosure* is more likely from DHMS, or the log of *Contract Days* from DLLS. Columns (1) and (2) examine *Asset Specificity*, columns (3) and (4) examine borrower risk rating (*Risk*), columns (5) and (6) examine leverage (*Liabilities/Assets*), and columns (7) and (8) examine *Trade Credit*. 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 definitions and descriptive statistics for all variables, including the firm characteristics used as controls. ***, **, * indicate statistical significance at the 1, 5, and 10 percent levels. Standard errors are reported in parentheses and are clustered at the country level.

	Expected Recovery Rate							
	Borrower Characteristic							
	Asset Specificity		Risk		Liabilities /Assets		Trade Credit	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Movable	-0.287***	-0.237***	-0.323***	-0.262***	-0.372***	-0.219***	-0.369***	-0.250***
	(0.088)	(0.044)	(0.090)	(0.044)	(0.062)	(0.043)	(0.075)	(0.045)
Movable × Characteristic	-0.135***	-0.042	-0.152**	0.029	-0.078**	0.008	-0.493**	-0.124
	(0.032)	(0.030)	(0.069)	(0.048)	(0.026)	(0.020)	(0.178)	(0.157)
Movable × Foreclosure	0.109		0.167		0.212***		0.208**	
	(0.092)		(0.095)		(0.069)		(0.079)	
Movable × Log Contract Days		-0.218***		-0.222***		-0.358***		-0.293***
		(0.061)		(0.050)		(0.071)		(0.076)
Movable × Characteristic × Foreclosure	0.171***		0.151*		0.082**		0.609***	
	(0.032)		(0.071)		(0.027)		(0.188)	
Movable × Characteristic × Log Contract Days		-0.088**		-0.226**		-0.098**		-0.538
		(0.040)		(0.103)		(0.038)		(0.316)
Firm Ratings	Included	Included	Included	Included	Included	Included	Included	Included
Loan Size	Included	Included	Included	Included	Included	Included	Included	Included
Firm Size	Included	Included	Included	Included	Included	Included	Included	Included
Balance Sheet Data (4 Ratios)	Included	Included	Included	Included	Included	Included	Included	Included
Fixed Effects								
Borrower	Included	Included	Included	Included	Included	Included	Included	Included
Time	Included	Included	Included	Included	Included	Included	Included	Included
Observations	4,744	4,744	4,744	4,744	4,744	4,744	4,744	4,744
R-squared	0.68	0.70	0.68	0.70	0.69	0.70	0.68	0.70

Table 9
Expected Recovery Rates: Opening Up Movable Collateral

This table presents OLS estimates of augmented versions of equation (4) that examine how the effect of borrower type on recovery rates varies with movable collateral type. Movable collateral type is *Equipment*, *Specific Assets* (including inventory), and *Accounts Receivable*. 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 equals zero otherwise. Enforcement is either a dummy variable indicating that *Foreclosure* is more likely from DHMS, the log of *Contract Days* from DLLS, or *Creditor Rights*, which 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 for borrowers with multiple loans only. All estimations include borrower and time fixed effects. Tables A1 and A2 in the Appendix provide definitions and descriptive statistics for all variables, including the firm characteristics used as controls. ***, **, * indicate statistical significance at the 1,5, and 10 percent levels. Standard errors are reported in parentheses and are clustered at the country level.

	Expected Recovery Rate			
		Enforcement		
		Creditor Rights	Foreclosure	Contract Days
	(1)	(2)	(3)	(4)
Equipment	-0.071	-0.123*	-0.080*	-0.068
	(0.047)	(0.063)	(0.045)	(0.045)
Specific Assets	-0.400***	-0.507***	-0.453***	-0.251**
	(0.081)	(0.050)	(0.065)	(0.087)
Accounts Receivable	-0.649***	-0.698***	-0.674***	-0.658***
	(0.088)	(0.091)	(0.086)	(0.187)
Equipment × Enforcement		0.111	-0.028	-0.060
		(0.067)	(0.051)	(0.049)
Specific Assets × Enforcement		0.375***	0.337***	-0.363***
		(0.068)	(0.071)	(0.112)
Accounts Receivable × Enforcement		0.189	0.555***	-0.027
		(0.153)	(0.098)	(0.263)
Firm Composition				
Firm Ratings	Included	Included	Included	Included
Loan Size	Included	Included	Included	Included
Firm Size	Included	Included	Included	Included
Balance Sheet Data (4 Ratios)	Included	Included	Included	Included
Fixed Effects				
Borrower	Included	Included	Included	Included
Time	Included	Included	Included	Included
Observations	4,744	4,744	4,744	4,744
R-squared	0.79	0.81	0.81	0.81

Table 10

Loan Interest Rates, Movable Collateral, and Expected Recovery Rates

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

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 B: 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 10 (cont.'d)
Loan Interest Rates, Movable Collateral, and Expected Recovery Rates

Panel C: Estimations of Interest Rates

	Interest Rate		
	(1)	(2)	(3)
Movable	0.318***	0.724***	
	(0.084)	(0.121)	
Movable × Creditor Rights		-0.849***	
		(0.153)	
Recovery Rate			-0.288*
			(0.178)
Firm Composition			
Firm Ratings	Included	Included	Included
Loan Size	Included	Included	Included
Firm Size	Included	Included	Included
Balance Sheet Data (4 Ratios)	Included	Included	Included
Fixed Effects			
Borrower	Included	Included	Included
Time	Included	Included	Included
Observations	1,350	1,350	1,350
R-squared	0.94	0.94	0.94

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 Doing Business 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 zero to four.	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 non-secured 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, with higher scores indicating that collateral laws are better designed to expand access to credit.	DB—data taken from 2005
Rule of Law	Assessment of the law and order tradition in a country.	LLSV
Legal Origin	A dummy variable that identifies the legal origin of the bankruptcy law of each country.	DHMS
Contract Enforcement Days	The number of days to resolve a payment dispute through courts.	DLLS
Enforcement Procedure	DHMS ask insolvency practitioners which procedure is likely to be used in each country for debt enforcement of a hypothetical hotel (foreclosure, liquidation, or an attempt at reorganization).	DHMS
Public Registry	A database owned by public authorities (usually the central bank or banking supervisory authority), which 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