When Do Laws and Institutions Affect Recovery Rates on Collateral?

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First draft: September 2014

This draft: May 2015

(Preliminary and Incomplete; Please do not quote)

Abstract

We examine when laws and institutions affect banks' expected recovery rates on collateral employing a cross-country dataset stemming from a large multinational bank. Using within country and firm variation, we document that laws and institutions have a large impact on banks' expected recovery rates on collateral when collateral is more susceptible to borrower agency problems and less redeployable or asset specific. We also show that higher expected recovery rates on collateral are beneficial to firms by reducing firms' cost of finance. The results shed light on the underlying economic channels through which weak laws and institutions undermine countries' financial and economic development.

I. 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), lending outcomes, and subsequent economic growth. Legal mechanisms and institutions allow lenders to enforce debt contracts in a predictable manner, either in court or through foreclosure proceedings. In turn, these debt enforcement institutions affect the lending practices of financial institutions. An obvious but arguably overlooked question is whether, and if so how, financial institutions overcome the legal environment in order to ensure the enforcement of secured debt contracts.

Collateral is central to secured debt contracts. Debtors pledge collateral to guarantee loans obtained from creditors, which reduces financing frictions even in advanced economies, but especially in developing countries. Ultimately, the efficiency of secured lending depends on both the ability of debtors to pledge collateral to the creditor, and the value of the collateral to the debtor upon enforcement of the debt contract. This raises several questions. What types of assets do banks accept as collateral, and how does the use of collateral vary with legal institutions? What enforcement valuations do banks apply to collateral and how do these valuations vary with legal institutions and collateral types? What aspects of the legal and institutional framework matter the most and when? Which economic channels are driving these relations? Despite the importance of these questions, empirical work on enforcement around the world has been limited due to data availability.[1] To address these questions, we employ a unique cross-country data set of a large multinational bank. Importantly for our purposes, the data include not only the type of collateral securing each loan, but also the bank's expect recovery rate on each collateral type i.e., the fraction of the collateral value that the bank expects to recover upon enforcement.

Djankov, Hart, McLeish and Shleifer (2008; henceforth DHMS) set the landscape of how debt enforcement varies at the institutional level. Abstracting away from differences in lending practices and collateral characteristics, DHMS study 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

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[1] Notable exceptions are Lerner and Schoar (2005), Qian and Strahan (2007), and Gennaioli and Rossi (2013).

a "going concern" versus "piecemeal sale"), and time to enforcement. One of the key features of the enforcement of security interests, not studied by DHMS or elsewhere, is the collateral contract, which stipulates the type of asset pledged as collateral, and its expected recovery rate.

In this paper, we study how laws and legal institutions impact on the bank's expected recovery rates on different types of collateral and how these impact firms' cost of credit. The fact that we have different types of collateral in the data is important as not all types are equally prone to the inefficiencies that weak laws and institutions may induce. We provide evidence on two plausible channels that may affect this relation: borrower agency problems and asset specificity (Shleifer and Vishny (1992)).[2] Borrower agency problems may relate to tunneling or the risk that borrowers double pledge the assets. We first study how borrower agency problems affect lending through collateral types and recovery rates. We expect that financial institutions expect lower recovery rates on collateral types that are more susceptible to agency problems, particularly in countries in weak creditor rights countries where enforcement takes a long time. They may also shift their asset composition towards collateral that is less prone to agency problems. The second channel links asset specificity to expected recovery rates and creditor rights. Asset specificity refers to collateral types with fewer alternative uses and smaller, more illiquid secondary markets. We expect that financial institutions place lower expected recovery rates on more asset specific collateral, particularly in countries in weak creditor countries, where such markets may be more illiquid or become so with the long enforcement times.

DHMS abstract away from such issues as they are working with a case study of a hypothetical mid-sized firm (a hotel). In their setting, they have one collateral type (the hotel) and it is held constant across different countries and thus abstract away from any sources of inefficiency arising from agency problems and asset specificity.[3] Our bank-internal data allow to study the impact of a country's laws and institutions on recovery rates on a set of collateral types that are accepted by the bank. This is important

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[2] Asset specificity is also often referred in the literature as limited redeployability (see, for example, Benmelech and Bergman (2008, 2009)). In the paper we use both terms interchangeably.

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

as banks may be able to undo the inefficiency induce their environment by accepting collateral that is less prone to the inefficiencies that weak laws and legal institutions may induce. The analysis makes use of the data and methodology used in Liberti and Mian (2010) who study how financial development affects the collateral cost of capital. They document that in less developed financial markets, lenders require higher collateral values per unit lend (i.e., lower loan-to-value ratios) and shift away their composition of acceptable collateral towards types that are less prone to agency problems. This paper uncovers one of the possible underlying drivers of this relationship: the impact that weak laws and institutions have on banks' expected recovery rates on collateral. We document when and why this impact is large using a real-world estimate of the expected efficiency of enforcing a security interest in each country.

While collateral-level measures of expected recovery rates on collateral are useful to address the question of interest, cross-country comparisons are difficult as differences in recovery rates across countries could be driven by country-specific factors beyond those of interest. Systematic differences in the industry mix or borrower pool may correlate with both the level of creditor rights in a country and the average recovery rates on collateral. If borrowers in low creditor rights countries have on average assets with lower recovery rates, we could be attributing lower recovery rates to creditor rights, when differences may be actually driven by different borrower pools. To overcome this identification challenge we use the methodology employed by Liberti and Mian (2010).[4] The methodology uses a *within-country* estimate of the creditor rights' cost on recovery rates that absorbs country-specific factors.

A simple example could help illustrate our methodology. Consider two economies: HCR and LCR, indicating high and low creditor rights countries. Suppose that in each economy, there are two types of collateral: those whose values are susceptible to agency problems and those that are not.[5] We refer to these as divertible and non-divertible types of collateral and we define the difference in recovery rates between divertible and non-divertible collateral within an economy as a country's *spread* in recovery rates. In equilibrium, this spread should be negative as even within a country, divertible

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[4] A similar identification strategy is employed in different contexts by Rajan and Zinglaes (1998) and Klapper, Laeven, and Rajan (2006), among others, to finesse omitted variable concerns in cross-country regressions.

[5] A similar example can be worked out for asset specificity.

collateral should have on average lower recovery rates than non-divertible collateral (hypothesis 1). HCR countries, where successful and timely enforcement is possible and secondary markets are more liquid should have on average smaller absolute spreads than LCR countries (hypothesis 2). In LCR countries, it typically takes a long-time before a security interest can be enforced, allowing both agency problems and time to erode the value of collateral susceptible to such problems, resulting in larger absolute spreads. By comparing the average differences in the *within-country* spread of HCR and LCR countries, we can thus obtain a *within-country* estimate of the creditor rights' cost on the recovery rates on collateral.

Focusing on differences in recovery rates (spread) instead of the levels of recovery rates, allows us to difference out level differences between HCR and LCR countries that may be driven by spurious country-specific factors. However, while the internal validity of our estimates cannot be threatened by unobserved country-specific factors, it can be threatened by unobserved factors *within* a country. This could happen, for example, if the relative use of divertible or non-divertible collateral varies systematically across industries and business cycle conditions differ across industries. A bias could also arise if the relative use of divertible or non-divertible collateral varies with unobserved borrower characteristics. To assuage such concerns in more conservative specifications, we force comparisons not only within the same country, but also within the same industry and time or even within the same borrower. Hence, confounding factors *within* a country are in this case eliminated

To measure creditor rights we use several indicators that are commonly used in the literature to capture the ability of secured creditors to successfully enforce their claims on a defaulting borrower. As a benchmark indicator we use the creditor rights index developed by LLSV. We also use several additional indicators of creditor rights that go beyond the "rules in the books" to capture the efficiency of enforcement in practice (developed by LLSV, Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2003; hereafter DLLS) and DHMS) and the existence of information sharing mechanisms such as public credit registries and private credit bureaus. Information sharing mechanisms are expected to help lenders screen and monitor their borrowers and to limit borrowers' ability to double pledge assets.

Collateral types are distinguished into divertible and non-divertible types using primarily a distinction between movable and non-movable collateral. Movable collateral such as equipment and

vehicles, inventory, and accounts receivable can be particularly vulnerable to borrower agency problems as they can be more easily diverted into alternative uses. Immovable collateral on the other hand such as land and other real estate are more difficult to divert and may be better able to hold their values as bankruptcy procedures drag on. For completeness, we also provide corresponding results for each collateral type separately. This allows us to better understand which types of divertible collateral may be particularly sensitive to creditor rights. Indicators of asset specificity are not available at the collateral type-level and are approximated using the borrowing firm's industry.

The analysis leads to the following insights. First, we find that on average the bank expects to recover about 85 percent of the collateral value, implying that about 15 percent of collateral value is lost during enforcement. The expected recovery rates on collateral are substantially lower with weak creditor protection at about 70 percent, imply a much larger loss in weak creditor rights countries. Second, taking the above described methodology to the data, we find that the recovery spread between divertible and non-divertible collateral is –between 45 to -55 percentage points in weak creditor rights countries and it only -5 to -9 percentage points in high creditor rights countries. Third, we identify two channels driving these results: borrower agency problems and asset specificity. Fourth, when facing high agency risk, the bank shifts its accepted asset composition towards better quality. Finally, we show that higher expected recovery rates on collateral are beneficial to firms as they map into lower interest rates on their loans.

Our analysis relates to Qian and Strahan (2007), Benmelech and Bergman (2009), Liberti and Mian (2010), and Cerqueiro, Ongena and Roszbach (2014). Benmelech and Bergman (2009) and Cerqueiro, Ongena and Roszbach (2014) find that greater redeployability of airlines and lower collateral values following a law change leads to lower and higher loan interest rates, respectively. We extend their analysis to a cross-country setting where we can study how creditor protection influences the link between expected recovery rates on different types of collateral and loan interest rates. Qian and Strahan (2007) study how laws and institutions shape financial contracts. While they study the impact of laws and institutions on terms of bank loans, we focus on recovery rates of collateral, and its ultimate impact on loan interest rates. We show that the expected recovery rate on collateral and not only the value of the pledged asset matters for loan interest rates. Finally, our study relates to Liberti and Mian (2010) who

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show that financial development eases collateral constraints. This paper uncovers one of the possible underlying drivers of this relationship: the impact that weak laws and institutions have on banks' expected recovery rates on collateral. We document when and why this impact is large. Using within country and firm variation, we show that weak laws and institutions have a large impact when collateral is more susceptible to borrower agency problems and less redeployable or asset specific.

The remainder of the paper is organized as follows. In section II we describe the data. 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. Section V studies whether higher expected recovery rates map into lower loan interest rates. Conclusions follow in Section VI.

II.   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 division and follow each loan over, on average, a two-year period from 2002 to 2004 on a quarterly frequency.[6] For each borrowing firm, we observe the industry they are operating, their size and internal risk rating as determined by the bank, and key balance sheet characteristics. For every loan, we observe the total approved loan, the outstanding loan amount and interest rate as well as the value and type of collateral ("asset class") securing each loan. The unit of observation is at the *borrower-asset class-time* level. For each firm, we can have multiple observations either because a firm has multiple loans over the sample period or because loans are secured by multiple asset classes, which we exploit for identification.

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[6] As Liberti and Mian (2010) point out the firms in the sample should not be thought as "mom and pop" micro firms. 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 US where the GDP per capita in 2003 was US$37,000, this would correspond to an average loan amount of US$3 million.

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*. For each asset class, the bank records two values, determined by external appraisers in each quarter. The first is the fair market value (FMV) or replacement value of the collateral. This is the gross price 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. This fair market value is independent of the expected costs of debt enforcement. The second value is the orderly liquidation value (OLV). It is equal to the FMV minus the bank's expected costs of repossessing and liquidating the pledged assets given the country's institutional framework and efficiency of enforcement. The OLV is an estimate of the gross amount that the asset would fetch in an auction-style liquidation allowing for reasonable time to identify all available buyers. The bank has control of the sale process. In other words, OLV represents the expected liquidation value of the asset under normal market conditions— not under fire-sale conditions. The OLV/FMV ratio represents the bank's expected recovery rates on the pledged assets, while $1 - OLV/FMV$ characterizes the bank's expected costs of repossessing and liquidating the pledged assets. Hence, the ratio of OLV/FMV provides us with a unique real-world estimate of the expected efficiency of enforcing a security interest in each country from the bank's perspective. The OLV/FMV ratio is our main variable of interest, which we refer to as the *RecoveryRate* on collateral. This differs from recovery rates on loans as the latter are also influenced by the borrowers default probabilities and the loan-to-value ratios.

Everything else equal, in countries with weak creditor rights—where enforcing a security interest takes a long time and bankruptcy procedures drag on— the 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 have smaller and more illiquid secondary markets). Movable assets such as *Accounts Receivable*, *Equipment & Vehicles*, and *Firm-Specific Assets* can be particularly vulnerable to such problems.[7] *Firm-Specific*

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

Assets such as inventory may also become obsolete as time passes, further exacerbating the negative impact of few alternative uses. We classify these asset classes as *Divertible*. Immovable assets such as *Real Estate* (e.g., land and other real estate) and creditor-held movable assets such as *Financial Instruments* (e.g., pledged deposits and other financial securities) and *Bank Letters of Credit* are less prone to agency problems and are largely redeployable. They may also be better able to hold their values as bankruptcy procedures drag on. We thus classify these asset classes as *Non-Divertible*.

Dividing 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 its susceptibility to agency problems and asset specificity.[8] A country's institutional setting is expected to influence the degree to which this vulnerability results in a significant loss in the collateral values that the bank expects to recover. This is exactly what our empirical analysis aspires to identify.

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 LLSV index taken from Djankov, Mcliesh and Shleifer (2007; hereafter DMS).[9] The LLSV index is the sum of four variables that capture the relative power of secured creditors in bankruptcy proceedings: 1) the requirement of creditor consent when a debtor files for reorganization (*Reorganization Restrictions*), 2) the ability of a creditor to seize collateral once a petition for reorganization is approved (*No Automatic Stay*), 3) whether secured creditors are paid first in liquidation (*Secured Creditors First*), and 4) whether the incumbent management does not retain control of the firm during reorganization (*Management Doesn't Say*). The index ranges between 0 and 4, with higher values indicating higher

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[8] Note that although Liberti and Mian (2010) use a different terminology to refer to their two broad categories of collateral, they refer to them as "firm-specific collateral" and "non-specific collateral", their grouping is essentially the same as ours and the underlying rational is similar. In 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 divertible and non-divertible 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.

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

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 DLLS. The longer it takes, the more an asset may be exposed to agency issues and the more their limited redeployability may adversely impact the bank's expected recovery rates. *Enforcement Procedure* is a survey-based indicator developed by DHMS. It indicates which procedure (foreclosure, reorganization, and 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.[10]

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. 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.

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[10] DHMS collected and studied several other characteristics of a country's bankruptcy law beyond those covered by the LLSV index 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. The reason is that we do not always have sufficient variation in our sample.

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 29,376 observations.[11] As can be observed in Table 1, the number of observations is not uniform across countries, varying from 5,329 in Korea to 122 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, for 38 percent of the sample countries the LLSV index has values of 3 or 4, while for 62 percent of the countries it has values of 2 or lower. 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 strength of the *Collateral Law* index also varies significantly across the sample with some countries having very high values (of 8 out of 8) and others having very low values (of 2 out of 8). Going beyond "rules in the books" we also observe substantial variation in the quality of law enforcement. 25 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 being 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*).

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[11] 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.

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.[12]

In Table 2 we provide descriptive statistics for the bank's expected recovery rates on collateral (i.e., our OLV/FMV ratio). We report the average expected recovery rates for all asset classes and countries in our sample as well as for HCR and LCR countries separately. Countries with an LLSV index equal to 3 or higher are classified as HCR countries, while countries with values equal to 2 or lower are classified as LCR countries. Corresponding summary statistics are also provided separately for *Divertible* and *Non-Divertible* collateral and for each asset class available in the data. The summary statistics are calculated at the *borrower-asset class-time* level as the regression analysis that follows. The last column of Table 2 indicates whether differences between HCR and LCR countries are statistically significant.

(Insert Table 2 about here)

As can be observed in Table 2, the average expected recovery rate on collateral across all countries and types of collateral in our sample is 85.2 percent (i.e., on average the bank expects that 14.8 percent of the value of the pledged assets will be lost during enforcement). However, there is substantial variation across different types of collateral and across HCR and LCR countries. In particular, *Divertible* collateral has on average lower expected recovery rates than *Non-Divertible* collateral, 73.2 percent as opposed to 98 percent, consistent with negative recovery spread in equilibrium (hypothesis 1). When distinguishing between HCR and LCR countries we observe that these spreads are primarily present in

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

LCR countries. In LCR countries the average expected recovery rates on *Divertible* collateral is 50.8 percent, while it is 97.9 percent for *Non-Divertible* collateral, suggesting an average spread of -47.1 percent. In HCR countries both *Divertible* and *Non-Divertible* collateral have high expected recovery rates of 93.6 and 98 percent, respectively, suggesting an average spread of -4.4 percent. These patterns are consistent with substantially smaller absolute spreads in HCR countries (hypothesis 2). When looking at each of the six classes of collateral in the data, we observe that *Divertible* collateral such as *Firm-Specific Assets* and *Accounts Receivable* exhibit the largest spreads. Instead, *Non-Divertible* types of collateral such as *Real Estate*, *Financial Instruments*, and *Bank Letters of Credit* exhibit almost no variation in spreads with respect to creditor rights, both economically and statistically.

Overall, these patterns are consistent with creditor rights having an important impact on banks' expected recovery rates on collateral. The differences in average spreads between HCR and LCR countries are -42.7 percent (i.e., -4.4 percent in HCR countries as opposed to -47.2 percent in LCR countries). Table 2, however, also reveals that not all types of collateral are equally represented in the two groups of countries. We find that *Divertible* collateral is more frequently pledged in LCR countries. This suggests that the types of collateral pledged may be constrained by supply-side factors (e.g., what borrowers have). The observed patterns 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 that were the case, we would have been observing that *Non-Divertible* collateral is more frequent in LCR countries.

III. Empirical Strategy

Let *RecoveryRate*$_{k,i,c,t}$ denote the bank's expected recovery rate on asset class k securing a loan to borrower i in country c at time t. *Divertible*$_k$ is a (0, 1) dummy variable indicating whether collateral k is divertible or not. As indicated earlier we use a generic definition based on the economic characteristics of the underlying asset. *Firm*$_{i,c,t}$ is a vector of time-varying firm characteristics. It includes the bank's ex-ante risk assessment of the borrower, a firm size classification based on firm sales, as well as key balance

sheet characteristics.[13] ε_c is the country-specific component of the error term, and $\varepsilon_{k,i,c,t}$ is the idiosyncratic component of the error term. To obtain estimates of the *spread* in recovery rates one could estimate the following model:

$$RecoveryRate_{k,i,c,t} = \alpha + \beta_1 Divertible_k + \gamma_1 Firm_{i,c,t} + (\varepsilon_c + \varepsilon_{k,i,c,t}). \qquad (1)$$

Estimates for the spread are given by β_1. Hypothesis 1 predicts a negative and statistically significant estimate for β_1. The concern in equation (1), however, is that country-specific factors, denoted by the country-specific component of the error term, ε_c, may be correlated with the type of collateral pledged, resulting in biased estimates for β_1. This could be due to systematic differences in the industry mix or the average quality of the borrower pool across countries, for example. Hence, to address this concern we use augmented specifications with *country*-fixed effects, α_c:

$$RecoveryRate_{k,i,c,t} = \alpha_c + \beta_1 Divertible_k + \gamma_1 Firm_{i,c,t} + \varepsilon_{k,i,c,t}. \qquad (2)$$

Introducing country-fixed effects, forces comparisons of recovery rates within the same country and thus takes care of concerns that relate to unobserved country-specific factors. In more conservative specifications, we replace the *country*-fixed effects with *country-industry-time*-fixed effects, $\alpha_{c,s,t}$, where s indexes industry. This forces comparisons not only within the same country, but also within the same industry and time, controlling for possible heterogeneities in business cycle conditions across industries. To assuage any concerns about unobserved borrower heterogeneity such as the relative use of divertible and non-divertible collateral across different types of borrowers, in more extreme specifications, we also introduce *borrower*-fixed effects, $\alpha_{c,i}$, forcing comparisons within the *same borrower*. These are possible as the same borrower can have multiple loans secured by different types of collateral.

To test whether higher creditor rights are associated with higher expected recovery rates on collateral, we augment equation (2) allowing for an interaction term between $Divertible_k$ and creditor rights, CR_c:

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[13] Firm balance sheet characteristics include: Cash to Total Assets, Account Receivable to Total Assets, Property, Plant and Equipment to Total Assets, and Inventory to Total Assets.

$$RecoveryRates_{k,i,c,t} = \alpha_c + \beta_1 Divertible_k + \beta_2 Divertible_k * CR_c + \gamma_1 Firm_{i,c,t} + \varepsilon_{k,i,c,t}. \quad (3)$$

If high creditor rights increase recovery rates on collateral, as hypothesis 2 predicts, the estimated coefficient for β_2 should be positive and statistically significant, mitigating the spread in recovery rates captured by β_1. As a benchmark indicator of creditor rights we use the LLSV index. To ease the exposition of our results and the interpretation of the estimated coefficients we employ a (0, 1) dummy variable, *LLSV*, that equals one if the LLSV index equals 3 or higher, and equals zero otherwise.[14] However, in subsequent specifications we also open-up the LLSV index into its individual components using four dummy variables—one for each component of the index— instead of *LLSV*.

To understand whether some asset classes are more susceptible to creditor rights we also estimate specifications of equations (2) and (3) where $Divertible_k$ is replaced with the individual asset class dummies. Hence, β_1 in equation (2) in this case measures the spread in recovery rates between a particular asset class and non-divertible collateral (i.e., the omitted group). In equation (3), where an interaction with *LLSV* is present, β_1 measures the size of this spread in LCR countries (i.e., when *LLSV* = 0), while $\beta_1 + \beta_2$ measures the size of the corresponding spread in HCR countries.

In additional specifications, we also present results using additional indicators of creditor rights that capture the efficiency of enforcement in practice (*Rule of Law*, *Contract Days*, *Enforcement Procedure*) and the existence of information sharing mechanisms (*Public Registry*, and *Private Bureau*). Since these measures capture aspects of creditor rights beyond those covered by the LLSV index, they are introduced in addition to the interaction term with *LLSV*. Furthermore, in additional specifications, we augment equation (3) allowing for interaction terms between *Divertible* and *Divertible*LLSV* with firm, collateral, and country characteristics that allow us to study the role of borrower agency problems and limited redeployability in HCR and LCR countries. To ease interpretation of the coefficients, we employ (0,1) dummy variables for all our creditor rights indicators of interest (i.e., equal to 1 when values above the median and zero below).

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[14] Our results are robust to using the LLSV index itself.

In all cases, equations (2) and (3) are estimated using ordinary least squares (OLS). The standard errors are clustered at the *country* level. Table A1 in the appendix provides summary statistics for all variables used in the paper. Because we use *country-*, *country-industry-time-*, and *borrower-*fixed effects, we also report appropriately demeaned standard deviations to have a sense of the amount of within-variation for each variable.

IV.   Results

The first two columns of Table 3 present our main findings. Columns (1) reports estimation results for equation (2) using country-fixed effects. Column (2) presents a corresponding specification for equation (3) using *LLSV* as a measure of creditor rights.[15] Results are strongly consistent with hypotheses 1 and 2. In column (1) we find that the expected recovery rates on divertible collateral are on average 27.1** percentage points lower than those on non-divertible collateral, consistent with a significantly negative spread in equilibrium (hypothesis 1).[16] When comparing the within-country spreads between HCR and LCR countries in column (2), we find that the estimated spread is much less pronounced in HCR countries (hypothesis 2). Our estimates indicate that in HCR countries the average spread in expected recovery rates is only -8.9*** percentage points as opposed to a staggering -45.3*** percentage points in LCR countries. This difference-in-difference comparison provides us with an estimate of creditor rights' impact on the expected costs of enforcing a security interest that cannot be influenced by spurious country-specific factors. In particular, the estimates suggest that 36.4** percentage points of collateral value is expected to be lost because of low creditor rights. This is of similar magnitude to the unconditional 42.9 percentage points reported in the descriptive statistics of Table 2.

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[15] As mentioned earlier, to ease the interpretation of our estimated coefficients we use a (0,1) dummy variable, *LLSV*, to distinguish high and low creditor rights countries. In unreported regressions, however, we confirm that our results are robust to using the LLSV index itself.

[16] *, **, and *** indicate whether the estimated coefficient is statistically significant at the 10, 5, and 1 percent levels, respectively.

(Insert Table 3 about here)

In columns (3) and (4) we push identification a step further by replacing the *country* fixed effects with *country-industry-time* and *borrower* fixed effects, respectively. Parameter identification in this case is obtained by exploiting variation not only within the same country, but also within the same industry and time or even within the same borrower. Hence, possible confounding factors *within* a country are in this case eliminated. As can be observed in columns (3) and (4), our results are maintained. The estimated spreads in HCR countries are -8.3 and -5.9 percentage points in columns (3) and (4), while they are -45*** and -55.2*** percentage points in LCR countries. The estimated spread differentials between HCR and LCR countries, suggest that the creditor rights' impact on the expected recovery rates is 36.7** and 49.3*** percentage points, respectively. All in all, we find that in HCR countries—where successful and timely seizure of collateral is possible— divertible and non-divertible collateral have similar recovery rates. In LCR countries—where enforcing a security interest takes a long time allowing agency problems and limited redeployability to erode the values of susceptible collateral— divertible collateral has as much as 55 percentage points higher recovery rates than non-divertible collateral.

Descriptive statistics in Table 1 indicate that some countries have a larger number of observations than others raising concerns whether our results are driven by one or two countries with a larger number of observations. To examine this possibility, we collapse the number of observations at the country-level, retaining one observation per country.[17] As can be observed in column (5), results are unaffected.

To understand which aspects of the LLSV index are correlated with the size of the spread, in Table 4 we open-up the LLSV index to its individual components. We first introduce them one by one and then add them all contemporaneously. When studying each component in isolation, we find that in countries where there is *No Automatic Stay* and where *Management Doesn't Stay* the differences in recovery rates between divertible and non-divertible collateral are significantly smaller. In countries

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[17] In particular, we first run 16 country-level regressions of equation (2). We then regress the estimated coefficient of *Divertible* on a constant and *LLSV*. These are the reported coefficients in column (5). Similar results hold when we apply weighted least squares with weights equal to "1/number of observations per country". In this case, the estimated coefficient of *Divertible* is -0.552*** and the coefficient of the interaction term with *LLSV* is 0.434***.

where there is automatic stay lenders are prohibited from enforcing their contracts while a bankruptcy case is proceeding. This takes effect upon borrowers file for bankruptcy. The intent is to give borrowers a breathing spell from their lenders while they develop a plan to reorganize their finances. The drawback is that this increases significantly the time that it takes for lenders to enforce theirs contracts and sell the pledged assets. Our results suggest that such delays may be particularly damming for divertible collateral. Removing current management from control of the business when bankruptcy proceedings begging and replacing with an administrator seems instead to help. *Reorganization Restrictions* and *Secured Creditors First* are not found to matter. When including all LLSV components jointly, only *Management Doesn't Stay* remains statistically significant.[18]

(Insert Table 4 about here)

To further understand which types of divertible collateral are driving the estimated spreads, in Table 5 we report estimation results for equations (2) and (3) using the individual asset class dummies instead of *Divertible*. Non-divertible asset classes is the omitted category. Hence, the estimated coefficients for each divertible asset class measure the spread in recovery rates between that asset class and the average non-divertible collateral in a similar way as Table 3. Columns (1) and (2) show that *Accounts Receivable* and *Firm-Specific Assets* have a 69.3*** and 35.7** percentage points lower expected recovery rates than non-divertible collateral. *Equipment & Vehicles*, instead, is not found to have systematically lower recovery rates than non-divertible collateral.

(Insert Table 5 about here)

In columns (3) and (4) we also allow for interaction terms between each divertible asset class and *LLSV*. The coefficient of each asset class measures the spread between that asset class and the omitted

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[18] Both *No Automatic Stay* and *Management Doesn't Stay* are significant when only including those two components of the LLSV Index.

category in LCR countries, while the combined coefficient between an asset class and its interaction with *LLSV* measures the corresponding spread in HCR countries. We find that the spreads for *Accounts Receivable* and *Firm-Specific Assets* vary a lot with creditor rights. For example, based on the coefficient in column (4), in LCR countries the recovery rates on *Accounts Receivable* are around 83 percentage points lower than those of non-divertible collateral, while they are as little as 57 percentage points lower in HCR countries (i.e., -0.832*** + 0.266*). These results suggest that account receivables are difficult to recover in both HCR and LCR counties as firms in default, regardless of creditor rights, may have little incentives to service the debt and collect the amounts due. *Firm-Specific Assets* exhibit a high sensitivity to creditor rights with spreads around -62 percentage points in LCR countries and only -8 percentage points in HCR countries (i.e., -0.622**+0.538***). The coefficients on *Equipment & Vehicles* and *Equipment & Vehicles*LLSV* are not statistically significant suggesting that this asset class has similar recovery rates than non-divertible assets and their recovery rates do not vary with creditor rights.

In Table 6 we turn to other creditor rights indicators widely used in the literature: *Collateral Law, Rule of Law, Contract Days, Enforcement Procedure, Public Registry,* and *Private Bureau*. Since these measures may capture aspects of creditor rights beyond the LLSV index, they are studied in addition to the interaction term with *LLSV*. Columns (1) to (6) report results from an augmented corresponding specification of equation (3) that allows for an interaction term between *Divertible* and each of these additional indicators. The label on top of columns (1) to (6) indicates the other creditor rights or information sharing indicator that is being considered in each case. (The inclusion of borrower-fixed effects in the specifications implies that the level effect of these indicators is encompassed.)

(Insert Table 6 about here)

The results show that the interaction terms of *Divertible* with *Collateral Law*, *Contract Days*, *Public Registry* and *Private Bureau* are statistically significant whereas the interaction terms of *Rule of Law* and the two indicators of enforcement procedure (*Foreclosure* and *Reorganization*) are not statistically significant. We find that strong collateral laws (*Collateral Law* = 1) and the existence of

information sharing mechanisms are associated with smaller absolute recovery spreads. The coefficient of *Contract Days* indicates that time may also play an important role as the recovery spread is more pronounced for firms operating in countries where enforcement takes a long time (*Contract Days* = 1). Overall, these results suggest that recovery spreads are less pronounced in countries where strong collateral laws and information sharing may limit agency problems as well as in countries where enforcement is speedy, limiting the impact of tunneling and asset specificity on vulnerable assets.

V.   Channels driving the variation in recovery rates and recovery spread

Table 3 showed that the recovery spread (i.e., the difference in the expected recovery rates of divertible assets and non-divertible assets) is about -50 percentage points in LCR and -6 percentage points in HCR. Table 6 further indicated that the limited redeployability of collateral and agency problems may be partly driving the recovery spreads between divertible and non-divertible collateral. We now further investigate these channels using an augmented equation (3) allowing for interaction terms between *Divertible* and *Divertible*LLSV* with firm, collateral, and country characteristics that allow us to study the role of agency problems and limited redeployabiltiy in HCR and LCR countries. Results are presented in Table 7.

(Insert Table 7 about here)

Columns (1) to (4) study how agency issues impact the recovery spreads in HCR and LCR countries. We employ different indicators to uncover the agency channel. Column (2) examines whether the risk of double pledgeability drives some of the differences in recovery spreads between HCR and LCR countries by studying whether the impact of creditor rights depends on the existence of a strong collateral law (i.e., by including interaction terms between *Divertible* and *Divertible*LLSV* with *Collateral Law*). We find that strong collateral laws reduces the recovery spread in LCR countries, suggesting that the risk of double pledgeability is a concern in these countries, partly driving the lower

recovery rates on divertible collateral. In HCR countries, double pledgeability is not found to play a significant role as the impact of collateral law is significantly reduced (i.e., the sum of 0.333** - 0.268*).

Columns (2) and (3) study how information sharing through public registries and private bureaus affects the recovery spreads in HCR and LCR countries. Information sharing is expected to reduce the risk of double pledgeability and tunneling by limiting information asymmetries between borrowers and lenders and among lenders. Columns (2) and (3) show that better information reduces the recovery spread in LCR countries, suggesting that double pledgeability and tunneling are serious concerns, partly driving the lower expected recovering rates of divertible collateral in LCR countries. In HCR countries, these issues are not found to play an important role as the coefficient of the triple interaction reduces significantly the estimated effect of these factors.

Column (4) focuses on firm risk as an indicator of agency issues. We use the bank's ex-ante risk rating as a measure of borrower agency risk.[19] We consider firms with a rating worse than A on an A to D scale as risky (with A being healthy firms). Faced with higher agency risk, the bank might lower its' expected recovery rates on collateral, particularly in LCR countries where inefficient enforcement may allow borrowers to tunnel the pledged assets and for assets more susceptible to such problems. However, the bank may also adjust the type of acceptable collateral from such borrowers to counter this increased risk. Results in column (4) confirm that agency problems are indeed a concern, particularly in LCR countries. We find that banks discount their expected recovery rates on collateral of high risk borrowers by around 9.2** in LCR countries. In HCR countries, agency problems do not seem to be a concern as the cumulative coefficient implies a corresponding discount of only 1.4 percentage points. The coefficients of the interaction terms with *Divertible* collateral indicate that in LCR countries, the expected recovery spreads for high risk borrowers is smaller in absolute terms (-0.322** as opposed to -0.46***), suggesting that banks in LCR countries may be offsetting part of the increased risk by requiring higher quality collateral from riskier borrowers. In HCR countries, where agency problems are not a concern this effect

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[19] The firm composition regarding the bank's ex-ante risk rating is very similar across creditor rights.

is not found to be operative, suggesting that laws that better protect the lender from agency concerns also mitigate the demand for better quality collateral from risky borrowers.[20]

Column (5) of Table 7 studies the impact of asset specificity on the recovery spread in HCR and LCR countries. We expect that the negative impact of asset specificity on the recovery spread is smaller when the legal system allows to enforce collateral quickly. Everything else equal, the ability to enforce collateral quickly should lead to higher recovery rates on collateral with limited redeployability with small and illiquid secondary markets. 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 US 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.[21] Results in column (5) show that the bank discounts divertible assets of firms in industries with high asset specificity only in LCR. In particular, it puts a 14** percentage point lower expected recovery rates on divertible assets from industries with high asset specificity compared to industries with low asset specificity. This impact is almost completely muted in HCR (i.e., the sum of -0.140**+0.126*).

VI.   Expected recovery rates on collateral and loan interest rates

Next step and investigate whether the pledging of divertible collateral and the expected recovery rates on collateral are reflected in the interest rate charged to the firm. Results are presented in Table 8. Panel A provides descriptive statistics on the variables employed in the analysis. Panel present estimation results. The dependent variable is the loan interest rate in % including all fees. It is the net spread, i.e., the gross interest rate charged on the loan minus the cost of funds. The independent variables include our variables of interest to be discussed next, firm composition variables, and a set of fixed effects. Column

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[20] We also employed firm size as another proxy for tunneling. The recovery spread does not differ across creditor rights when comparing large and small firms.

[21] We rely on the 1984-1996 period as Compustat only allows to measure machinery equipment from property for that period.

(1) and (2) of Panel B includes country-industry-time fixed effects whereas the other columns include borrower-fixed effects. Column (1) addresses the question whether firms that pledge divertible collateral (i.e., collateral that is more prone to agency problems and limited redeployability) pay higher loan rates. The coefficient on *Divertible* shows that firms that pledge divertible collateral on average pay a 4.2* basis point higher loan interest rate. Columns (2) and (3) open up the impact of *Divertible* according to creditor rights using country-industry-time and borrower-fixed effects, respectively. We find that firms that pledge divertible collateral in LCR countries pay higher interest rates. This is not the case in HCR countries as the coefficient on *Divertible*LLSV* more than completely mitigates the effect of *Divertible*. The coefficients in column (3) are smaller in magnitude compared to column (2). This shows that controlling for unobserved heterogeneity through borrower-fixed effects is important. As a t-test on the joint significance of *Divertible* and *Divertible*LLSV* reveal, pledging divertible collateral increases loan rates only in LCR countries. Column (4) goes one step further and studies how the expected recovery rate impacts on the loan interest rate. Firms that pledge collateral with a greater recovery rate pay lower loan interest rates; a one standard deviation higher recovery rate goes together with a 3.1 basis point lower loan rate (i.e., -0.095*0.324).

The expected recovery rates on collateral reflect what the bank expects to collect as a fraction of the fair market value of the collateral in case it needs to be enforced. T he time to enforce and repossess collateral may differ substantially across countries and creditor rights. As a proxy for time to enforcement in each country, we employ the time reported in DHMS to resolve their hypothetical hotel. This has two limitations. First, we lose information on two countries (India and Pakistan) as these are not covered in DHMS. Second, we assume the time to resolve is identical across asset classes. As in DHMS, we use a discount rate of 8 percent across countries. The results in column (5) show that a higher present value of recovery rate (*PV(RecoveryRate)*) leads to a lower loan rate. An increase of *PV(RecoveryRate)* from the average of LCR countries (0.575) to the average of HCR countries (0.812) would induce a drop of loan rates by 12 basis points (i.e., -0.502*0.237). This shows that variation in recovery rates also generate economically meaningful impacts on loan interest rates.

VII.   Concluding Remarks

Collateral is central to secured debt contracts. In this paper we exploit a unique cross-country dataset to study how creditor rights affect the recovery rates of different by-the-bank accepted collateral types. We find that the average expected recovery rate of collateral across countries and collateral types is about 85 percent, implying an inefficiency of 15 percent. The expected recovery rate is lower with weak creditor protection (about 70 percent) compared to strong creditor protection (about 4 percent)

We further study the spread in recovery rates between divertible and non-divertible asset classes *within* a country or borrower to infer the causal impact of creditor rights. We find that the recovery spread is much more pronounced with weak creditor protection. While the recovery spread is about -5 percentage points with strong creditor protection, it turns to a considerable -45 to -55 percentage points with weak creditor protection. We uncover two channels driving the recovery spread and its variation with creditor rights: borrower agency risk and assets specificity or limited redeployability.

Higher recovery rates are not only beneficial to banks in case of repossession. Firms benefit from greater recovery rates as they enjoy lower loan interest rates when recovery rates are higher.

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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 comes 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.

Country	Sample		Rules in the books						Quality of Enforcement in Practice					Information Sharing	
			DMS					DB	LLSV	DLLS	DHMS			DMS	
											Enforcement Procedure				
	# 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)	(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	1,140	348	2	0	1	1	0	3	7.02	305	1	0	0	1	1
3 Czech	2,100	631	3	0	1	1	1	5	8.33	300	0	0	1	1	1
4 Hong Kong	5,263	1,277	4	1	1	1	1	8	8.22	211	1	0	0	0	0
5 Hungary	342	227	1	1	0	0	0	6	6.67	365	1	0	0	0	1
6 India	4,259	602	2	1	0	1	0	5	4.17	425				0	0
7 Korea	5,329	1,213	3	0	1	1	1	6	6.67	75	0	1	0	0	1
8 Malaysia	2,573	627	3	1	1	1	0	8	6.78	300	0	0	1	1	1
9 Pakistan	581	96	1	0	0	1	0	5	3.03	395				1	0
10 Romania	459	134	2	0	1	1	0	6	6.67	335	0	1	0	0	0
11 Singapore	888	241	3	0	1	1	1	8	8.57	69	1	0	0	0	0
12 Slovakia	806	157	2	0	1	1	0	8	6.67	565	0	0	1	1	0
13 South Africa	749	395	3	1	0	1	1	8	4.42	277	0	0	1	0	1
14 Sri Lanka	122	86	2	1	0	0	1	2	5.00	440	1	0	0	0	1
15 Taiwan	775	373	2	0	0	1	1	3	8.52	210	0	1	0	1	1
16 Turkey	3,789	814	2	1	1	0	0	3	5.18	330	0	1	0	1	0
Total/Average															
Our sample	29,376	7,422	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 index equal or greater than 3 are classified as HCR countries, while countries with values equal or lower than 2 are classified as LCR countries. Columns (11) and (12) provide the difference between high and low creditor right countries (Diff High-Low). For each set of countries we provide summary statistics for all collateral classes, and break down summary statistics for divertible and non-divertible collateral as well as for our 6 asset classes available in the data. Column (12) reports clustered standard errors at the country-industry level. Obs stands for observations and st. dev. for standard deviation. Table A2 in the Appendix provides definitions for all variables.

	Divertible Collateral	All Countries			HCR			LCR			Diff. High - Low	
		mean	st. dev.	obs	mean	st. dev.	obs	mean	st. dev.	obs		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
All Collateral Classes		0.852	0.324	29,376	0.959	0.162	16,902	0.707	0.418	12,474	0.253	0.000
Economic Characteristic												
Divertible	1	0.732	0.407	15,139	0.936	0.214	7,922	0.508	0.449	7,217	0.429	0.000
Non-Divertible	0	0.980	0.093	14,237	0.980	0.090	8,980	0.979	0.097	5,257	0.000	0.875
Asset Class												
Accounts Receivable	1	0.198	0.397	2,192	0.548	0.498	367	0.128	0.332	1,825	0.420	0.000
Equipment & Vehicles	1	0.975	0.125	8,479	0.990	0.057	5,510	0.948	0.194	2,969	0.042	0.000
Firm-Specific Assets	1	0.533	0.404	4,468	0.863	0.290	2,045	0.255	0.247	2,423	0.608	0.000
Real Estate	0	0.976	0.093	10,355	0.976	0.097	7,271	0.977	0.083	3,084	-0.001	0.493
Financial Instruments	0	0.986	0.097	3,397	0.994	0.052	1,419	0.980	0.118	1,978	0.013	0.000
Bank Letters of Credit	0	1.000	0.002	485	1.000	0.000	290	1.000	0.004	195	0.000	0.252

Table 3

Spread in Recovery Rates and Creditor Rights: Divertible vs. Non-Divertible Collateral

This table presents OLS estimates of equations (2) and (3). The dependent variable is the bank's expected recovery rate on collateral as measured by the OLV/FMV ratio. *Divertible* is a dummy variable that equals one if collateral is divertible, and equals zero otherwise. *LLSV* is a dummy variable that equals one if a country's value of the LLSV index equals 3 or higher, and it equals zero otherwise. Column (5) presents the results of a robustness test where we collapse by country and treat every country as one observation (see footnote 13). 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 parenthesis and are clustered at the country level.

	Expected Recovery Rate				
	Borrower-Asset Class-Time Level				Country Level
	(1)	(2)	(3)	(4)	(5)
Divertible	-0.271**	-0.453***	-0.450***	-0.552***	-0.421***
	(0.103)	(0.130)	(0.135)	(0.117)	(0.094)
Divertible × *LLSV*		0.364**	0.367**	0.493***	0.303*
		(0.133)	(0.138)	(0.122)	(0.154)
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					
Country	Included	Included			
Country-Industry-Time			Included		
Borrower				Included	
Observations	29,376	29,376	29,376	29,376	16
R-squared	0.47	0.52	0.61	0.82	0.22

Table 4

Spread in Recovery Rates and Creditor Rights: Opening up LLSV

This table presents OLS estimates of equation (3). The dependent variable is the bank's expected recovery rate on collateral as measured by the OLV/FMV ratio. *Divertible* is a dummy variable that equals one if collateral is divertible, and equals zero otherwise. *LLSV* is a dummy variable that equals one if a country's value of the LLSV index equals 3 or higher, and it equals zero otherwise. *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 equals 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 parenthesis and are clustered at the country level.

	Expected Recovery Rate				
	(1)	(2)	(3)	(4)	(5)
Divertible	-0.498***	-0.596***	-0.333***	-0.505***	-0.720***
	(0.165)	(0.122)	(0.056)	(0.136)	(0.193)
Divertible × Reorg. Restrictions	0.288				0.168
	(0.187)				(0.127)
Divertible × No Automatic Stay		0.392**			0.248
		(0.156)			(0.156)
Divertible × Secured Creditors First			-0.085		0.089
			(0.176)		(0.172)
Divertible × Management Doesn't Stay				0.411**	0.265*
				(0.147)	(0.130)
Firm Composition					
Firm Ratings	Included	Included	Included	Included	Included
Loan Size	Included	Included	Included	Included	Included
Firm Size	Included	Included	Included	Included	Included
Balance Sheet Data (4 Ratios)	Included	Included	Included	Included	Included
Fixed Effects					
Borrower	Included	Included	Included	Included	Included
Observations	29,376	29,376	29,376	29,376	29,376
R-squared	0.81	0.82	0.80	0.81	0.82

Table 5

Spread in Recovery Rates and Creditor Rights: Opening up Divertible Collateral

This table presents OLS estimates of modified versions of equations (2) and (3) where *Divertible* is replaced by three collateral type dummies. The omitted category is *Non-Divertible* collateral. The dependent variable is in all cases the bank's expected recovery rates on collateral. *LLSV* is a dummy variable that equals one if a country's value of the LLSV index equals 3 or higher, and equals zero otherwise. Tables A1 and A2 in the Appendix provide definitions and descriptive statistics for all variables, including the firms' characteristics used as controls. For both equation (2) and (3) we report two sets of specifications where we include *country-industry-time* or *borrower* fixed effects. ***, **, * indicate statistical significance at the 1, 5, and 10 percent levels, respectively. Standard errors are reported in parenthesis and are clustered at the country level.

	Expected Recovery Rate			
	(1)	(2)	(3)	(4)
Divertible Collateral Types				
Accounts Receivable	-0.693***	-0.778***	-0.836***	-0.832***
	(0.123)	(0.128)	(0.110)	(0.123)
Equipment&Vehicles	0.026	-0.045	-0.039	-0.102
	(0.040)	(0.047)	(0.051)	(0.065)
Firm-Specific Assets	-0.357**	-0.512***	-0.649***	-0.622***
	(0.157)	(0.115)	(0.060)	(0.053)
Accounts Receivable × LLSV			0.377*	0.266*
			(0.178)	(0.146)
Equipment&Vehicles × LLSV			0.043	0.104
			(0.051)	(0.065)
Firm-Specific Assets × LLSV			0.565***	0.538***
			(0.062)	(0.055)
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				
Country-Industry-Time	Included		Included	
Borrower		Included		Included
Observations	29,376	29,376	29,376	29,376
R-squared	0.76	0.88	0.82	0.90

Table 6

Spread in Recovery Rates and Creditor Rights: Going Beyond the LLSV index

This table presents OLS estimates of an augmented version of equation (3) that in addition to the interaction with the LLSV creditor rights indicator allows for interaction with additional aspects of the quality of laws and institutions in a country. The dependent variable is in all cases the bank's expected recovery rate on collateral. *Divertible* is a dummy variable that equals one if collateral is divertible, and equals zero otherwise. *LLSV* is a dummy variable that equals one if a country's value of the LLSV index equals 3 or higher, and equals zero otherwise. *Collateral Law* measures the degree to which collateral law protects the rights of debtors and creditors, taken from the World Bank's 2005 Doing Business Survey (DB). *Rule of Law* is a survey-based assessment by investors in different countries of the law and order environment they operate in, taken from LLSV. *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 DLLS. To ease interpretation, for *Rule of Law, Contract Days* and *Collateral Law*, we create a dummy variable equal to one when above the median and zero otherwise. *Enforcement Procedure* is a survey-based indicator developed by DHMS. It indicates which procedure (foreclosure, reorganization, and 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. We interact *Divertible* with *Foreclosure* and *Reorganization*. The base case is therefore liquidation. *Public Registry* and *Private Bureau* indicate whether such an information sharing mechanism is present in the country or not. Tables A1 and A2 in the Appendix provide detailed definitions and descriptives for all variables, including the firms' characteristics used as controls. ***, **, * indicate statistical significance at the 1, 5, and 10 percent levels, respectively. Standard errors are reported in parenthesis and are clustered at the country level.

	Expected Recovery Rates					
	Collateral Law	Rule of Law	Contract Days	Enforcement Procedure	Public Registry	Private Bureau
	(1)	(2)	(3)	(4)	(5)	(6)
Divertible	-0.564***	-0.582***	-0.328***	-0.536***	-0.656***	-0.588***
	(0.118)	(0.118)	(0.062)	(0.113)	(0.029)	(0.040)
Divertible × LLSV	0.267**	0.343**	0.268***	0.352***	0.517***	0.083
	(0.107)	(0.151)	(0.072)	(0.084)	(0.035)	(0.055)
Divertible × Collateral Law	0.256**					
	(0.116)					
Divertible × Rule of Law		0.199				
		(0.182)				
Divertible × Contract Days			-0.295**			
			(0.120)			
Divertible × Foreclosure				0.273		
				(0.158)		
Divertible × Reorganization				0.168		
				(0.099)		
Divertible × Public Registry					0.257***	
					(0.040)	
Divertible × Private Bureau						0.448***
						(0.066)
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						
Borrower	Included	Included	Included	Included	Included	Included
Observations	29,376	29,376	29,376	24,536	29,376	29,376
R-squared	0.82	0.82	0.83	0.78	0.82	0.82

Table 7

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

This table presents OLS estimates of augmented versions of equation (3) allowing for interaction terms between *Divertible* and *Divertible*LLSV* with firm, collateral, and country characteristics. The dependent variable is in all cases the bank's expected recovery rate on collateral. *Divertible* is a dummy variable that equals one if collateral is divertible, and equals zero otherwise. *LLSV* is a dummy variable that equals one if a country's value of the LLSV index equals 3 or higher, and equals zero otherwise. *Asset specificity* is measured as the median book value of the industry's "machinery and equipment + inventories" divided by the book value of total assets, employing US compustat data at a 2 digit SIC code level. *Collateral Law* measures the degree to which collateral law protects the rights of debtors and creditors, taken from the World Bank's 2005 Doing Business Survey (DB). To ease interpretation, for and *Collateral Law* and *Asset Specificity,,* we create a dummy variable equal to one when above the median and zero otherwise. *Public Registry* and *Private Bureau* indicate whether such an information sharing mechanism is present in the country or not. *Firm Risk* is a dummy variable equal to one when the firm's risk grade equals B, C or D (on an A to D scale, with A high quality firms), zero otherwise. Tables A1 and A2 in the Appendix provide detailed definitions and descriptives for all variables, including the firms' characteristics used as controls. ***, **, * indicate statistical significance at the 1, 5, and 10 percent levels, respectively. Standard errors are reported in parenthesis and are clustered at the country level.

	Expected Recovery Rates				Asset Specificity
Channel ---------------------->		Agency			
	Collateral Law	Information Sharing		Firm Risk	
		Public Registry	Private Bureau		
	(1)	(2)	(3)	(4)	(5)
Divertible	-0.569***	-0.689***	-0.588***	-0.460***	-0.443**
	(0.118)	(0.045)	(0.109)	(0.135)	(0.151)
Divertible × LLSV	0.449***	0.619***	0.489***	0.383**	0.392**
	(0.117)	(0.068)	(0.104)	(0.137)	(0.155)
Divertible × Channel	0.333**	0.345***	0.478***	0.138***	-0.140**
	(0.142)	(0.113)	(0.155)	(0.021)	(0.060)
Divertible × Channel × LLSV	-0.268*	-0.312**	-0.439**	-0.138***	0.126*
	(0.146)	(0.127)	(0.151)	(0.032)	(0.061)
Channel				-0.092**	
				(0.040)	
Channel × LLSV				0.078*	
				(0.042)	
Firm Composition					
Firm Ratings	Included	Included	Included	Included	Included
Loan Size	Included	Included	Included	Included	Included
Firm Size	Included	Included	Included	Included	Included
Balance Sheet Data (4 Ratios)	Included	Included	Included	Included	Included
Fixed Effects					
Country-Industry-Time				Included	
Borrower	Included	Included	Included		Included
Observations	29,376	29,376	29,376	29,376	29,376
R-squared	0.82	0.83	0.83	0.63	0.82

Table 8

Loan Interest Rates, Divertible 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. Panel A provides descriptive statistics of the variables employed in the empirical model. *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. *PV(Recovery Rate)* is the present value of the recovery rate using as a proxy for time to enforcement in each country the time reported in DHMS to resolve a hypothetical hotel and as discount rate 8%. Panel B presents the regression results. *Divertible* is a dummy variable that equals one if collateral is divertible, and equals zero otherwise. *LLSV* is a dummy variable that equals one if a country's value of the LLSV index equals 3 or higher, and equals zero otherwise. Columns (1) and (2) include country-industry-time fixed effects whereas Columns (3), (4) and (5) include borrower fixed effects. Tables A1 and A2 in the Appendix provide detailed definitions and descriptives for all variables, including the firms' characteristics used as controls. ***, **, * indicate statistical significance at the 1, 5, and 10 percent levels, respectively. Standard errors are reported in parenthesis and are clustered at the borrower level.

Panel A: Descriptive Statistics

	All Countries	LCR	HCR	Difference
Recovery Rate	0.852	0.707	0.959	-0.253***
Obs.	29,376	12,474	16,902	
Present Value(Recovery Rate)	0.738	0.575	0.812	-0.237***
Obs.	24,536	7,634	16,902	
Interest Rate	7.952	7.366	8.386	-1.020***
Obs.	29,376	12,474	16,902	

Panel B: Loan Interest Rate Regressions

	Interest Rate				
	(1)	(2)	(3)	(4)	(5)
Divertible	0.042*	0.177***	0.060***		
	(0.025)	(0.034)	(0.020)		
Divertible × LLSV		-0.278***	-0.119***		
		(0.050)	(0.045)		
Recovery Rate				-0.095**	
				(0.039)	
PV(Recovery Rate)					-0.502***
					(0.129)
Firm Composition					
Loan Size	Included	Included	Included	Included	Included
Firm Ratings	Included	Included	Included	Included	Included
Firm Size	Included	Included	Included	Included	Included
Balance Sheet Data (4 Ratios)	Included	Included	Included	Included	Included
Fixed Effects					
Country-Industry-Time	Included	Included			
Borrower			Included	Included	Included
Observations	29,376	29,376	29,376	29,376	24,536
R-squared	0.84	0.84	0.95	0.95	0.95

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. *Divertible* is a dummy variable that equals one if collateral is divertible, and equals zero otherwise. *Asset specificity* is measured as the median book value of the industry's "machinery and equipment + inventories" divided by the book value of total assets, employing US compustat data at a 2 digit SIC code level. We create a dummy variable equal to one when an industry is above median asset specific and zero otherwise. Firm rating is the bank's ex-ante risk grade of the firm with A being 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	0.852	0.324	0.218	0.176	0.097	1	29,376
Divertible	0.515	0.500	0.414	0.353	0.140	1	29,376
Asset Specificity (Industry)	0.572	0.495	0.458	0.000	0.000	1	29,376
Firm Rating							
A	0.921	0.269	0.254	0.197	0.056	1	29,376
B	0.042	0.202	0.195	0.137	0.048	0	29,376
C	0.019	0.138	0.123	0.073	0.023	0	29,376
D	0.017	0.128	0.113	0.067	0.011	0	29,376
Firm Size							
0	0.328	0.469	0.363	0.300	0.038	0	29,376
1	0.414	0.493	0.446	0.405	0.067	0	29,376
2	0.173	0.378	0.351	0.301	0.055	0	29,376
3	0.086	0.280	0.245	0.198	0.025	0	29,376
Loan Size (in USD'000)	576	959	800	662	177	227	29,376
Collateralization by Asset Class:							
Account Receivables	0.075	0.263	0.166	0.139	0.083	0	29,376
Equipment & Vehicles	0.289	0.453	0.263	0.207	0.074	0	29,376
Firm-Specific Assets	0.152	0.359	0.265	0.224	0.101	0	29,376
Real Estate	0.352	0.478	0.350	0.301	0.093	0	29,376
Financial Instruments	0.116	0.320	0.230	0.176	0.100	0	29,376
Bank Letters of Credit	0.017	0.127	0.089	0.036	0.009	0	29,376
Balance Sheet Information							
Cash/Total Assets	0.054	0.037	0.035	0.030	0.014	0.050	29,376
Account Receivables/Total Assets	0.246	0.129	0.110	0.093	0.043	0.253	29,376
PP&E/Total Assets	0.353	0.268	0.219	0.175	0.084	0.309	29,376
Inventory/Total Assets	0.248	0.177	0.156	0.128	0.051	0.227	29,376

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 Laporta, 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 nonsecured 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. 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 8 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
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 public registry is defined as 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 bureau is 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