HOW COLLATERAL LAWS SHAPE LENDING AND SECTORAL ACTIVITY

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ABSTRACT

We demonstrate the central importance of creditors' ability to use "movable" assets as collateral (as distinct from "immovable" real estate) when borrowing from banks. Using a unique cross-country micro-level loan dataset containing loan-to-value ratios for different assets, we find that loan-to-values of loans collateralized with movable assets are lower in countries with weak collateral laws, relative to immovable assets, and that lending is biased towards the use of immovable assets. Using sector-level data, we find that weak movable collateral laws create distortions in the allocation of resources that favor immovable-based production. An analysis of Slovakia's collateral law reform confirms our findings.

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I. Introduction

The ability of creditors to enforce their contracts with debtors is fundamental to the market for credit. A debtor who cannot commit to repay her loan will find it difficult if not impossible to obtain one. Over the past two decades, scores of academic articles have demonstrated the validity and importance of creditors' rights for the supply of credit by showing how cross-country differences in the rights of creditors and reforms within countries that improve creditors' rights are associated with dramatic differences in the supply of bank credit and economic growth.[2] In this paper, we provide evidence on a new channel through which legal systems affect debt contracting, and in turn, credit supply and real economic activity. We demonstrate the central importance of creditors' ability to use "movable" assets as collateral (as distinct from "immovable" real estate) when borrowing from banks.

"Movable" assets consist of all non-real estate assets (such as machinery, accounts receivable, and inventory). According to the World Bank, creditors in emerging markets are usually reluctant to accept movable assets as collateral (Fleisig et al., 2006). That is a major problem for firms that rely on bank credit because movable assets are central to the production processes of many firms in developed and emerging market countries, and in the absence of legal system shortcomings, movable assets are the most important class of collateral used in bank credit. For example, within the United States, 63 percent of collateralized loans made to small and medium-sized enterprises are collateralized by movable assets.[3]

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[2] King and Levine (1993), Levine and Zervos (1998), La Porta et al. (1997, 1998), Taylor (1998), and Beck et al. (2000) employed innovative statistical techniques to identify cross-country patterns. A later group of scholars—most notably Rajan and Zingales (1998), Wurgler (2000), Cetorelli and Gamberra (2001), Fisman and Love (2004), and Beck et al. (2008)—focused on the development of sectors as well as countries, and they reached the same conclusion: finance leads growth. Research focusing on the growth of regions within countries by Jayaratne and Strahan (1996), Black and Strahan (2002), Guiso et al. (2004), Cetorelli and Strahan (2006), Dehejia and Lleras-Muney (2007), and Correa (2008) produced broadly similar results. There are also various articles focusing on how creditors' rights differences affect the structure of loans and the identity of lenders. See, for example, Demirguc-Kunt and Maksimovic (1998), Qian and Strahan (2007), Bae and Goyal (2009), and Liberti and Mian (2010).

[3] Specifically, 46% of collateralized loans are collateralized by machinery, and 17% collateralized by inventory and accounts receivable. Data on collateralized lending for SMEs in the U.S. comes from the Federal Reserve Board's Survey of Small Business Finance (SSBF). The SSBF combines accounts receivable and inventory. Accounts receivable and inventory are the two most fundamental forms of asset-based financing since they combine elements of secured lending and short-term business loans. A firm would use the value of their accounts receivable and inventory as collateral to secure financing to produce and sell their products and services. The financing is then repaid by converting the inventory to cash, either directly or through the collection of accounts receivables (see Udell, 2004). See Appendix Table A.2 for details.

In this paper, we argue that the root of the inability to make use of movables collateral in many emerging markets reflects problems in legal regimes governing movables collateral use. Each country has a collateral law for immovable assets and another law for movable assets. Although collateral laws for real estate loans tend to be relatively well developed worldwide, creditors in many countries are reluctant to lend against movable assets because their legal systems limit the usefulness of such assets as collateral. In particular, legal systems for movables are weak in three dimensions: they limit the scope of movable assets that can be used as collateral, they lack centralized registration systems to monitor the security interests (to make sure no other lender has rights to the same collateral), and they allow enforcement in the event of default only through courts.[4]

We explore how the sophistication of a country's collateral laws for movable assets affects loan supply, reflected in the loan-to-value (LTV) ratios for loans secured by movables assets compared to loans against immovable assets. We employ a novel cross-country micro-level dataset containing small and medium business secured loans issued by an anonymous global bank (which we label GlobalBank) in 12 emerging market countries. One advantage of the dataset is that it provides information regarding the liquidation value of the asset being pledged as collateral.[5] This allows us to construct comparable LTVs, using meaningful measures of asset value, for loans collateralized by different types of assets – something that the previous literature has been unable to do, due to the lack of data on asset liquidation values.

Another novel contribution of our study is our analysis of how different countries' treatment of movable assets as collateral shapes the allocation of resources across sectors. Because emerging market finance is typically bank debt, and is often collateralized, constraints on LTV and debt capacity should also constrain economic activity.[6] Specifically, we analyze how collateral laws affect the sectoral

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[4] Article 9 of the Uniform Commercial Code (U.C.C.) governs secured transactions for movable assets in the U.S. According to the U.C.C., security interests over movables are well defined, easily registered, and can be seized easily if default occurs without the necessity of a judicial procedure (see Section 9-607).

[5] As per GlobalBank credit manuals, the asset value is the fair market value that a willing and informed buyer would pay in less than 180 days under normal (non-fire sale) conditions.

[6] According to the World Bank's *Enterprise Surveys*, which are performed in over 100 countries, collateral is required for bank loans in 75% of loans worldwide. Moreover, the lack of collateral is one of the primary reasons for

allocation of production between movable-intensive and immovable-intensive producers using sector-level output data covering the universe of manufacturing firms in our sample of countries.

We first investigate how the lending supply behavior of GlobalBank responds to differences in the quality of collateral protection for movable assets. We identify within-country differences in LTV across loans collateralized with movable and immovable assets for a single lender. Next, we examine how these within-country differences in loan supply and LTV are affected by different legal treatment of movable collateral. We measure cross-country differences in the quality of movable collateral laws using World Bank data from *Doing Business* to focus specifically on each country's legal treatment of the three components of effectively secured transactions (creation, monitoring, and enforcement) over movable collateral. We start by showing that movables-backed loans are more frequent in countries with strong legal frameworks for movable collateral (which we label "strong-law countries") than in weak-law countries. Next, we show that LTVs for loans collateralized by movable assets are higher in strong-law countries, but that LTVs for loans collateralized by immovable assets are similar across countries. According to our difference-in-differences estimation, LTVs of loans collateralized with movable assets are on average 27.6 percentage points higher, relative to LTVs for loans collateralized by immovable assets, in strong-law countries relative to weak-law countries.

One concern in interpreting our cross-sectional regressions is the potential influence of omitted factors that could explain the observed relationship between collateral laws and debt contracting. We deal with this concern in two ways. First, we control for country characteristics that could affect the LTVs of movable and immovable assets differentially, such as the efficiency of contract enforcement, efficiency of bankruptcy procedures, rule of law, and property rights. Our results are robust to controlling for these variables. Second, we take advantage of the fact that one of the countries in our sample – Slovakia – improved all three components of movable collateral law during our sample period. To provide further

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the rejection of credit (Fleisig et al., 2006). Understanding the effects of movable collateral laws on production is particularly important given that on average 78% of developing countries' capital is in movable assets, and only 22% is in immovable assets (Alvarez de la Campa, 2011).

causal evidence on the effects of collateral laws, we examine the lending behavior in Slovakia around the collateral law reform. Examining collateral in a within-borrower framework, we find that the LTVs for movable assets rose substantially after the policy reform, relative to immovable assets. The magnitude of this within-borrower change (20 percentage points) is similar to the magnitude of the cross-country difference between weak- and strong-law countries. To address the concern that the Slovakia results could be driven by other shocks or policies affecting movable and immovable assets differentially, we conduct a placebo test using the experience of the Czech Republic, a country that did not reform its collateral law. Given the similarities between the two countries, it is plausible that both were exposed to similar shocks. We falsely assume that the Czech Republic reformed at the same time as Slovakia, but we reject that assumption, finding no change over time in the LTVs for loans backed by movable assets in the Czech Republic.

To investigate the consequences of collateral laws for real economic activity, we study how collateral law differences affect the sectoral allocation of resources among manufacturing firms. Our measures of sectoral composition are from UNIDO data, which provide each country's sector-specific output for 22 sectors. The sample of countries covered by UNIDO is more extensive than the GlobalBank sample of emerging market countries we employ in our analysis of lending. We measure exogenous immovable asset-intensity of each manufacturing sector using data for the U.S. sectoral composition of assets (ratio of value of land and buildings to total assets), which should be relatively free from distortions related to ineffective movable collateral laws. Examining the within-country allocation of resources across collateral law frameworks for the 12 GlobalBank countries, we find that weak-law countries allocate 15.4% more production to immovable-intensive sectors than strong-law countries. We also find that the investment rate in immovable-intensive sectors in weak-law countries is 3 percentage points higher than in strong-law countries. Results for a broader sample of 76 countries are similar but of smaller magnitude.

We recognize that it may be possible to object to our OLS results on sectoral allocation because of concerns about endogeneity bias due either to omitted variables or reverse causality. With respect to the possibility of reverse causality, it is conceivable that countries with a comparative advantage in real-estate intensive sectors do not have as great a need for a strong movable law. We address that potential problem in two ways. First, we show that there is no correlation between the collateral law index and a measure of natural resource abundance, which shows that the most obvious source of reverse causality is implausible empirically. Second, we employ differences in legal origin as an instrument for differences in collateral laws, and find that, under the assumed exclusion restriction, the observed association between collateral law quality and sectoral allocation appears to be the result of exogenous variation in collateral laws.

Instrumenting with legal origin provides strong evidence against reverse causality, but with respect to concerns about omitted variables, it is possible that legal origin is correlated with other omitted country characteristics that affect sectoral allocation, which would violate the exclusion restriction. We consider, in particular, that the ability to collateralize using movable assets may be a proxy for other protections of creditors' rights. To address that concern, we control for differences in the efficiency of contract enforcement, efficiency of bankruptcy procedures, rule of law, and property rights, and the results remain unchanged. Not only does the inclusion of these controls not affect our regression findings regarding the importance of the ability to collateralize with movables, we also find that our results are stronger in countries with poorer legal efficiency. This reflects the fact that collateral rights for movables often are most important in countries where courts operate poorly, because these collateral rights often provide a means of avoiding lengthy court deliberations. Of course, one may be concerned that some of these variables are endogenous, which would mean that adding them as controls does not fully eliminate the possibility of omitted variables bias. To further address omitted variables bias concerns, we examine sectoral shifts in production within Slovakia after its movable asset collateral reform. Consistent with our

cross-sectional results, we find important sectoral shifts in production in favor of movables-intensive producers after the reform.

Finally, we also investigate which aspects of legal system differences are most important for explaining our results. We find that the existence of collateral registries to register security interests over movable assets and the possibility of enforcing security interests without court intervention – not the mere existence of laws permitting the collateralization of movable assets – drive our results. When we control for out-of-court enforcement for immovable assets, we find that the movable-enforcement coefficient remains unchanged, while the immovable-enforcement coefficient is not statistically significant. This suggests that out-of-court enforcement is more valuable for movable than immovable assets, because movables can depreciate more quickly and disappear more easily.

In summary, our paper makes three important and novel contributions. First, we highlight the importance of movable assets in providing debt capacity and identify a new channel through which collateral rights on movable assets drive important cross-country variation in debt contracting. Second, as a result of data constraints, prior analyses employ proxies for the liquidation value of assets.[7] Because we have detailed data on asset liquidation values, we are the first paper to employ the actual estimated LTV ratios employed by lenders for different asset classes as a measure of debt capacity. Finally, we are the first to analyze how creditors' rights influences on credit supply affect the composition of aggregate real economic activity.

Although we are the first to analyze the linkages among collateral laws, LTVs, and sectoral allocation, a number of papers investigate how cross-country differences in the supply of credit is explained by the existence and enforcement of secured creditors' rights, especially with respect to

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[7] For example, Benmelech et al. (2005) and Benmelech (2009) employ property-specific zoning assignments and diversity of track gauges in 19th century American railroads, respectively, to capture variation in liquidation values. One et al. (2015) estimate the liquidation value of real estate collateral using a hedonic model of land prices.

collateralization.[8] Liberti and Mian (2010) show that collateral is a binding constraint on lending, and that this constraint tends to bind more in relatively underdeveloped financial markets. Specifically, they show that the spread in collateral between high and low-risk borrowers decreases with the degree of financial development of the economies.[9] Cerqueiro et al. (2014) study the effects of a 2004 Swedish law that exogenously reduced the value of collateral. They find that, even in a country as developed as Sweden, this change produced increases in interest rates on loans, tightened credit limits, reduced investments in monitoring collateral values and borrowers, and higher delinquency rates on loans. Haselmann et al. (2009) show in their study of legal reforms in Eastern Europe's transition economies that changes in collateral laws mattered more for the supply of credit than changes in bankruptcy laws.

Our paper is also close in spirit to Campello and Larrain (2016), who provide a detailed case study of a Romanian legal reform that permitted movable assets to be pledged as collateral. They show that the reform broadened access to credit, particularly for firms operating in sectors making intensive use of movable capital, resulting in a sharp increase in the employment and capital stock share of those firms. They analyze the problem from the point of view of the firms, because they have access to balance sheet data on firms' total debt. Our paper complements their work by analyzing the problem from the point of view of the creditors, which we can do because we have access to more granular loan-level data with

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[8] There are also large theoretical and empirical literatures on the role of collateral in loan contracting, which we do not review in detail here, including Lacker (2001), Bester (1985), Chan and Thakor (1987), Berger and Udell (1990), Boot and Thakor (1994), Rajan and Winton (1995), Gorton and Kahn (2000), Longhofer and Santos (2000), John et al. (2003), Djankov et al. (2003), Benmelech et al. (2005), Jimenez et al. (2006), Gan (2007), Djankov et al. (2007), Ono and Uesugi (2009), Benmelech (2009), Benmelech and Bergman (2009, 2011), Berger et al. (2011, 2013), Godlewski and Weill (2011), Chaney et al. (2012), Rampini and Viswanathan (2013), Campello and Giambona (2013), and Mann (2015). Some recent work has qualified some of the earlier discussions of the effects of collateral rights by showing that increases in creditors' rights to collateral that reduce debtors' bargaining power – particularly with respect to the disposition of collateral – can reduce the amount of lending through contractions in demand, even when the supply of lending increases (Lilienfeld-Toal et al. 2012 and Vig 2013).

[9] It is worth noting that both Liberti and Mian (2010) and our paper use GlobalBank as a test laboratory. While Liberti and Mian (2010) explore cross-sectionally how differences in financial development impact collateralization rates, our paper analyzes cross-sectionally and within-country how differences in movable laws impact debt capacity measured by LTV. This allows us to construct a precise link between the institution of a country (i.e., movable law) and the asset pledged (i.e., movable asset). In addition, besides analyzing the effects on lending, we analyze the effects on real economic activity. In terms of data, the sample of borrowers and countries in Liberti and Mian (2010) is different to ours due to the filtering restrictions we apply. Also, we estimate LTV using the fair market liquidation value, as is typical in real estate-backed loans, while the collateralization rate in Liberti and Mian (2010) employs the net asset liquidation value, which assumes a shorter sale-horizon of 3 to 6 months.

information on the assets pledged as collateral. Moreover, we extend their work by analyzing the consequences of movable collateral laws on aggregate economic activity.[10]

We also contribute to the literature that examines different aspects of creditors' rights. Differences in creditors' rights can reflect alternative bankruptcy rules (e.g., the rules governing reorganization vs. liquidation), differences in the rights of secured vs. unsecured creditors, different protections for various types of security interests (in real estate vs. movable assets), differences in the ways collateral rights are enforced, and differences in the extent to which the judicial system enforces these rules impartially and expeditiously. For example, Jappelli et al. (2005), Chemin (2010), and Ponticelli (2013) show that the way rights are enforced, or not, by courts can be as important as the existence of rights as a matter of law. Our results complement this literature by showing that out-of-court enforcement can work as a substitute for an inefficient judiciary. That is, making courts less important might be beneficial for financial contracting.

The remainder of the paper is organized as follows. Section II discusses data sources. Section III describes our identification strategy. Section IV reports empirical findings related to GlobalBank's lending in 12 emerging market countries and the collateral reform in Slovakia. Section V provides additional results for the GlobalBank lending analysis. Section VI examines the effects on the sectoral allocation of resources. Section VII reports additional results for the sectoral analysis. Section VIII concludes.

II. Data Sources

Our study employs data primarily from three sources: the detailed lending records of an anonymous global bank, the World Bank's *Doing Business* data (including components of those data that are not publicly available), and UNIDO data on countries' sectoral allocation of production.

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[10] Love et al. (2015) use the World Bank's firm-level surveys for a large sample of countries to explore the impact of introducing collateral registries for movable assets on firms' access to bank finance. They find that introducing collateral registries increases firms' access to bank finance, particularly for smaller firms.

GlobalBank provided data on secured loans it makes to small and medium-sized enterprises (SMEs) during the years 2002-2004 in 16 emerging market countries. In our study, we include loans that are collateralized either by immovables (real estate assets) or by movables (machinery, inventory and accounts receivable). We exclude loans collateralized by both types of collateral from our sample, because for these loans we cannot gauge the relative contribution of each type of collateral. Four of the 16 countries (Brazil, Korea, South Africa, and Taiwan), however, had too few observations of real estate-collateralized loans to be included in our study and so we were left with data for 12 countries (Chile, Czech Republic, Hong Kong, Hungary, India, Malaysia, Pakistan, Romania, Singapore, Slovakia, Sri Lanka, and Turkey).[11] We have access to all the asset-backed programs that GlobalBank developed in emerging markets during the early 2000s as part of an "embedded bank" strategy. One of the main goals of this strategy was for GlobalBank to act as a genuinely local bank in order to compete with local banks in these regions.

Given the cross-sectional nature of the main regression analysis, we include one loan per firm in our sample; if there are multiple loans per borrower, we use the first observed loan. Loans and firms are dropped from the sample as the result of the various sample exclusion criteria. We begin with 7,056 single-collateral loans and 2,803 multiple-collateral loans contracted with a total of 8,379 firms in our sample of 16 countries. We drop 2,620 firms with 2,881 loans that are located in one of the four excluded countries. For the other 12 countries, we begin with 4,691 single-collateral loans and 2,287 multiple-collateral loans, which are made to 5,759 firms. We exclude 467 of the single-collateral loans and 671 of the multiple-collateral loans in these 12 countries from our main tests because they are collateralized by Supra-collateral, which we describe below. Our total sample of loans collateralized either by movables or immovables for the 12 countries includes 4,224 loans (and firms), 1,128 of which are collateralized by movable assets and 3,096 of which are collateralized by immovable assets.

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[11] We are unaware of the reasons why real estate-collateralized lending by GlobalBank to SMEs is absent in Brazil, Korea, South Africa, and Taiwan.

We measure loan quantity as the term-loan amount or the amount actually drawn on a line of credit. We define the liquidation value of the pledged asset as the fair market liquidation value of the collateral as appraised by GlobalBank. This value does not include a discount due to asset fire sales or the presence of constrained buyers, as in Shleifer and Vishny (1992). In terms of the internal process to determine the liquidation value, an external independent assessor or appraiser determines the price that a willing and informed buyer would pay to a willing and informed seller when neither party is under pressure to conclude the transaction.[12] Unfortunately, we are unable to observe interest rate data at the individual loan-contract level because we obtained the data from GlobalBank's risk-management division located in New York. This division is not responsible for collecting and assessing interest rate data at the loan-contract level.

In addition to the loan categories already mentioned, we also include another category of loans that we label Supra collateral loans, which adds another 467 loans (and firms) to our sample, bringing the total sample to 4,691 loans. The Supra-collateral category, which is a formally a category of movable assets, includes loans collateralized by cash deposits or other cash assets placed in GlobalBank, or by foreign cash deposits, as well as loans backed by commercial letters of credit enforced abroad (related to import/export lending), or by stand-by letters of credit or other credit guarantees enforced outside of the borrowing firm's country.[13] Foreign deposits, local cash deposits, certificates of deposits and bonds are forms of cash asset collateral that enjoy the legal right of recoupment or set-off, which means that the bank effectively has immediate access to these forms of collateral without relying on collateral laws governing movable assets. Standby letters and other letters of credit or guarantees typically are provided

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[12] See Degryse et al. (2014) on how legal institutions across countries affect the relationship between the appraised liquidation value and the minimum expected recovery value that the bank estimates for different types of collateral.

[13] There are several advantages of using cash as collateral. From the lender's standpoint, cash collateral is a cost-effective secured lending method since, in the case of default and if collateral is seized, repossession costs are minimized. From the borrower's standpoint, cash can be used to build and improve their credit ratings. Because the type of borrowers in our data may have problems having access to unsecured credit, Supra-collateral may be used as a means to solve these imperfections.

by subsidiaries of GlobalBank in a foreign country or by other acceptable counterparty banks with good reputation and with which GlobalBank has daily operations.[14]

To measure differences across countries in strength of movable collateral laws, we turned to the World Bank's *Doing Business* dataset to construct an index that captures the ability to use movable assets effectively in loan contracts. The World Bank captures many different aspects of collateral laws through various components that it measures, and its staff kindly agreed to share those individual component measures for our sample of countries for the year 2005, which is the first year for which data are available.

The World Bank measures are based on a questionnaire administered to financial lawyers and verified through analysis of laws and regulations as well as public sources of information on collateral laws. *Doing Business* provides information on eight different features of collateral laws and gives each feature a 0/1 score. We construct a movable collateral law index ("MC Law Index") for each country by summing the scores of seven of those components.[15] Thus, the MC Law Index ranges from 0 to 7. A score of 1 is assigned for the following features of the laws, each of which is important for the ability of creditors to use movable assets as loan collateral:

1. The law allows a business to grant a non-possessory security right in a single category of 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.

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[14] Letters of credit are regulated by the International Chamber of Commerce (ICC) and Uniform Customs and Practice for Documentary Credits (UCP), which control the terms of the letter of credit and the payment procedure for drawing upon it.

[15] Our results are invariant to including the eighth component in our MC Law Index, but we do not do so because we believe that this component contains significant errors. The omitted component pertains to the following feature: "Any business may use movable assets as collateral while keeping possession of the assets, and any financial institution may accept such assets as collateral." We found that this variable almost always took the value of one in the dataset, and in the few cases where it took the value of zero, we were aware that this coding was incorrect.

5. Secured creditors are paid first (for example, before tax claims and employee claims) when a debtor defaults outside an insolvency procedure.
6. A collateral registry or registration institution for security interests over movable property is in operation, unified geographically and by asset type, with an electronic database indexed by debtors' names.
7. The law allows parties to agree in a movable collateral agreement that the lender may enforce its security right out of court.

The first five features of the MC Law Index relate to the creation component of secured transactions; they determine the scope of movable assets that can be pledged as collateral. The sixth feature relates to the monitoring component; creditors must register the security interest in a collateral registry to ensure that no other lender has rights over the same collateral. The seventh feature corresponds to the enforcement component; it determines whether the creditor is allowed to repossess the collateral (in the event of default) privately with the borrower, bypassing the court system.

Because our loan data are available for the period 2002-2004, while our MC Law Index data are derived from 2005, we performed an extensive independent search to ensure that no reforms to secured lending laws in our 12 countries had occurred during the period, 2002-2005. For all but one of the 12 countries, we identified no changes during those years.

The exception is Slovakia, which passed a major reform on the collateralization of movables in late 2002. Slovakia introduced a new secured transactions law, based on the EBRD Model Law on Secured Transactions. Prior to the passage of the law, creditors in Slovakia mostly relied on fiduciary transfer of title to secure their obligations. The new law allowed the creation of security interests over movable assets without having to transfer possession to the creditor. The law also gave creditors private enforcement rights, including the ability to repossess collateral without having to go to court. The law became effective on January 1st 2003, with the introduction of the Charges Register, a modern centralized registry for security interests over movable assets, operated by Slovakia's Chamber of Notaries. A security interest could be registered in minutes at any local office through an electronic terminal for as little as 30 euros. The reform was considered a success and became the subject of numerous press accounts. Annual filings in the collateral registry increased from 7,508 in 2003 to 31,968 in 2007, a per

annum increase of over 50 percent. In January 2003, *The Economist* went so far as to qualify the reformed Slovak secured transactions law as "the world's best rules on collateral."[16]

We obtain data on the sectoral composition of output by country from the United Nations Industrial Development Organization's (UNIDO) Industrial Statistics dataset (INDSTAT-2). UNIDO provides yearly information for 22 two-digit manufacturing industries (ISIC revision 3) for a large number of countries for a large number of years. We use data on sectoral output measured in U.S. dollars. We also obtain from UNIDO data on the sectoral investment rate, defined as the ratio between gross fixed capital formation and output.[17] We construct a single cross-section, averaging data for the period 2002-2004.

Data for Sri Lanka and Pakistan are not available from this data source. Thus, the sample constructed to coincide with our GlobalBank sample consists of 220 observations corresponding to 10 countries and 22 sectors. We also report regression results on the sectoral composition of output and the investment rate for a larger sample of 76 countries, which include many countries other than the 10 that are in our GlobalBank dataset. As before, we use the UNIDO data on sectoral composition and investment, and the World Bank data to construct our MC Law Index score for the countries included in this larger sample.

III. Identification Strategy

In this section, we explain the identification strategies used in the two parts of our empirical analysis (the GlobalBank lending analysis and the sectoral output analysis) to confront potential problems of endogeneity bias related either to omitted variables or reverse causality.

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[16] When we include Slovakia in the cross-sectional analysis of countries, we only include loan observations for the pre-reform period. When we separately analyze the changes in lending behavior within Slovakia over time, we include the entire Slovakian sample, in order to measure the effect of the reform on movables lending.

[17] Wurgler (2000) also uses gross investment data from UNIDO to study the link between financial markets and the allocation of capital.

For the lending analysis, we estimate the effect of collateral law strength on LTVs of movable-backed loans relative to immovable-backed loans. To do so, we exploit two sources of variation: variation in collateral law strength across countries and within-country variation across collateral types. In particular, we compare the difference between LTVs of loans collateralized by movable and immovable assets in countries with strong relative to weak collateral laws. Our identification assumption is that other country characteristics affect LTVs of movable and immovable collateral equally.

We do not consider reverse causality to be a legitimate endogeneity concern in the lending analysis: it is implausible that the LTV of a given firm might affect the passage of the collateral law. However, there could be an omitted variables problem: country characteristics correlated with movable collateral law could affect LTVs of movable and immovable collateral differentially. For example, if movable assets depreciate faster than immovable assets, movable assets might lose more value in a protracted bankruptcy proceeding, which could lead to a lower LTV for movable-backed loans. To deal with this concern, we control for four country variables that could affect movable and immovable assets differentially: the efficiency of contract enforcement, the efficiency of the bankruptcy procedure, rule of law, and property rights (in Section IV.A we explain how we select these variables). We recognize that there could be other unobserved country characteristics that could affect movable and immovable assets differentially. To address that problem, we take advantage of the fact that one of the countries in our sample –Slovakia– passed a movable collateral reform in the middle of our sample period.

To analyze Slovakia's 2003 reform, we exploit two sources of variation: within-firm variation across time and variation across collateral types. As long as unobserved country characteristics affecting movable and immovable assets differentially did not change with the reform, the pre-post comparison will remove the influence of those unchanging effects. Our identification assumption is that any other country shocks at the time of the reform affected LTVs of movable and immovable collateral equally.

One potential concern is that Slovakia joined the European Union (EU) in 2004. To become an EU member, a country has to implement and enforce all current EU rules. The potential problem is that Slovakia may have implemented other policies affecting movable and immovable assets differentially at the moment of the collateral reform. In fact, Slovakia did not implement either a bankruptcy or a judicial reform at this time, which as explained above, are the sorts of policies that could plausibly have a differential effect on the use of movable assets as effective collateral.[18] Nevertheless, there could have been other unobserved shocks affecting movable and immovable assets differentially at the time of the collateral reform.

To deal with that potential problem, we consider the experience of the Czech Republic, Slovakia's neighbor, which did not reform its collateral law in 2003. Given the many similarities of the two countries (both were part of the same country until 1993, both have a similar industrial structure, and both joined the EU in 2004), it is reasonable to assume that they would have been subject to similar unobserved shocks around 2003. We therefore calculate the change in LTVs before and after 2003 in Czech Republic, which should capture unobserved shocks affecting Slovakia around that time.

B. Sectoral Output Analysis

For the sectoral production analysis, we estimate the effect of movable collateral law strength on the output share of real estate-intensive versus non-intensive sectors. We again exploit two sources of variation: variation in collateral law strength across countries and within-county variation in real estate intensity across sectors. Our identification assumption is that other country characteristics affect the output share of real estate-intensive and non-intensive sectors equally.

With respect to potential endogeneity bias for the sectoral analysis, both omitted variables and reverse causality are legitimate concerns. Reverse causality is a concern because it is possible, in particular, that countries with a comparative advantage in real-estate intensive sectors do not have as great

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[18] Slovakia passed a new bankruptcy law in 2007 (four years after the collateral reform) and introduced a judicial council in 2001 (two years before the collateral reform).

a need to create strong movable collateral rights. The causality could therefore flow from an exogenously higher output share in real-estate intensive sectors to a weaker collateral law.

We address that potential problem in two ways. First, we analyze the plausibility of the reverse causality argument. As a proxy for a country's comparative advantage in real-estate intensive sectors, we use a measure of natural resource abundance, defined as the real value of petroleum, coal, natural gas, and metals produced per capita (Haber and Menaldo, 2011). The correlation between the MC Law Index and natural resource abundance is small (-0.017) and statistically insignificant (p-value of 0.852). Thus, it is not true that countries abundant in natural resources tend to have weaker movable collateral laws.

Second, we address the reverse causality concern using legal origin as instrument for movable collateral law. Clearly, legal origin precedes the establishment of any patterns related to industrial specialization, which makes legal origin a useful instrument for the purposes of considering the potential importance of reverse causality. To measure a country's legal origin, we rely on the classification of La Porta et al. (1997, 1998). In our sample, legal origin is a strong predictor of movable collateral law strength. Specifically, legal origin is ordinally ranked in terms of their positive influence on collateral law as follows: English (highest), German (middle), and French (lowest).[19] When we instrument with legal origin, the effect of movable collateral law on sectoral allocation remains large and statistically significant.

With respect to omitted variables bias, instrumenting with legal origin is less convincing for resolving endogeneity concerns. A country's legal origin might capture the effects of omitted country characteristics that affect sectoral allocation, which would violate the exclusion restriction. As before, we address the omitted variables problems by controlling for the same country variables we used in the GlobalBank lending analysis. In addition, to deal with unobserved country characteristics, we examine the

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[19] The French-legal origin countries are Chile, Romania, and Turkey; the German-legal origin countries are the Czech Republic, Hungary, and Slovakia; the English-legal origin countries are Hong Kong, India, Malaysia, and Singapore.

changes in the output shares of real-estate intensive sectors in Slovakia before and after its collateral reform.

IV. Movable Asset Collateral Laws and GlobalBank's Lending

A. Cross-country Analysis

We start by calculating the fraction of total GlobalBank loans collateralized by immovable assets in each country. For each of the 12 countries in our sample, we calculate the frequency of immovable-backed loans. We then sort the countries into two groups – above-median-MC Law Index score ("strong-law") countries and below-median-MC Law Index score ("weak-law") countries. The average frequency of immovable-backed loans is 76.6% in weak-law countries and 69.6% in strong-law countries. The difference of 7 percentage points is statistically significant at the 1% level, which indicates that GlobalBank lends more against immovable assets in countries that have weak laws for movable collateral.

Next, we analyze the relationship between collateral laws and loan-to-value ratios. Figure 1 plots the differences in the average LTVs between GlobalBank loans collateralized by immovable and movable assets, against the MC Law Index. As the figure shows, loans collateralized by immovables have higher average LTVs, and the greater the value of the MC Law Index score, the less the difference between the LTVs for loans collateralized by immovables and movables. Figure 1 is consistent with the notion that a greater legal ability to collateralize movable assets is associated with a greater supply of movable-collateralized loans, relative to immovables.

[Insert Figure 1 here]

In Table 1, we compute the average LTV ratios for each of the two collateralized loan types in each country, as well as the average for countries with weak and strong collateral laws. As Table 1 shows, LTVs on loans collateralized by immovables are similar in weak-law and strong-law countries (0.817 for weak-law countries versus 0.912 for strong-law countries). However, for loans collateralized by movable

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assets the average LTVs for the two groups are very different (0.454 versus 0.827).[20] The fact that there is

a difference in average LTVs for immovables lending between weak-law and strong-law countries

indicates that weak-law countries may have broader creditors' rights problems that affect LTVs for both

movables and immovables. The spread in LTVs across immovable and movable collateral is 0.085

(=0.912-0.827) in strong-law countries and 0.364 (=0.817-0.454) in weak-law countries, with the

difference across legal frameworks significant at the 1% level. However, the ability to collateralize loans

against movable assets is dissimilar; in weak-law countries, the inability to collateralize using movable

assets results in much lower LTVs for movable-backed loans.

[Insert Table 1 here]

In order to test the effect of movable collateral laws on LTVs, we run the following cross-

sectional difference-in-differences estimation:

$$LTV_i = \alpha_c + \beta Movable_i + \gamma Law_c * Movable_i + \delta Z_i + \lambda X_c * Movable_i + \varepsilon_i,$$

where LTV_i is the loan-to-value for a loan made to firm i and Law_c is a strong-law indicator variable that

takes the value 1 if the country is above the median value of the MC Law Index score and 0 otherwise.

We use an indicator variable to reduce measurement error, since we believe that the equally weighted

index may not be a precise indicator of the quality of collateral laws for movables.[21] $Movable_i$ is a

movable indicator variable that takes the value 1 if the loan is collateralized by a movable asset and 0

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[20] Appendix Table A.1 provides detailed information on each country's use of movable and immovable assets, and the LTVs of loans collateralized by movables, immovables, or supra-collateral. Appendix Table A.2 gives a breakdown of movable assets into two main sub-categories – machinery, and inventory plus accounts receivable – which are employed in our discussion of robustness below. Interestingly, in emerging markets movables loans tend to be backed more frequently by inventory and accounts receivable than by machinery, which is the opposite of the tendency in the U.S. That pattern is especially true in weak-law countries. We believe that the relative under-utilization of machinery reflects substitution into machinery leasing, which is a way for firms to borrow the machinery (which remains the property of the lessor) without resorting to a bank loan. We also note that for both types of countries, LTVs for machinery loans are a bit higher than for loans against inventory and accounts receivable. This also may reflect the availability of machinery leasing, which is generally employed by less-creditworthy borrowers, and therefore, may result in higher average LTVs for loans against machinery.

[21] Our results are robust to using a continuous variable measuring the MC Law Index score and to dividing countries into finer categories, rather than above- and below-median levels of the MC Law Index (see Section V.C).

otherwise. The specification includes a full set of country fixed effects (α_c).[22] The coefficient of primary interest is γ, which is identified from the within-country variation across collateral types. The coefficient measures the difference between LTVs of loans collateralized by movable and immovable assets in strong-law countries, relative to the same difference in weak-law countries.[23]

We include borrower-level characteristics to control for differences in the supply of collateral. Z_i includes the bank's internal measure of firm size[24], the bank's internal risk rating, the ratio of net fixed assets-to-total assets, the ratio of cash-to-total assets, the ratio of accounts receivables-to-total assets, and the ratio of EBITDA-to-sales. Finally, we control for country characteristics related to the operation of the legal system, interacted with the movable indicator, which could affect LTVs of movable and immovable collateral differentially. X_c includes *Time to Enforce a Contract*, defined as the number of years required to enforce a contract, *Time to Resolve Insolvency*, defined as the number of years required to resolve an insolvency procedure, *Rule of Law*, which captures the extent to which agents have confidence in and abide by the rules of society, and *Property Rights*, which captures the extent to which private economic activity is facilitated by an effective legal system.[25] We chose these four legal system control variables on the basis of an analysis reported in Table A.3. There we considered a broad range of legal and macroeconomic variables, and investigated the extent to which any of them was correlated with loan-to-value ratios on loans. We find that only four of the measures (our four chosen controls) co-vary significantly with LTVs.[26] We include only two controls at a time in columns (3) and (4) of Table 2, given the limited number of countries in our sample.

Table 2 reports the LTV regression results, for different specifications. The *Law*Movable* interaction term is positive, large, statistically significant, and stable across all three specifications.

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[22] We cluster standard errors at the country level. Because we have a relatively small number of clusters, we compute the standard errors using block bootstrapping (see Cameron et al., 2008).

[23] Because the *Law* term varies at the country level, the country fixed effects will absorb it.

[24] Firm size is an indicator variable that takes the value of 3, 2, 1 and 0, for firms with net sales >\$25 million, <\$25 million and >\$5 million, <\$5 million and >\$1 million and <\$1 million, respectively.

[25] The data for these country variables comes from the World Bank's *World Development Indicators*.

[26] The other control variables we considered were: GDP per Capita, Private Credit to GDP, Creditor Rights, Information Sharing, and Cost of Insolvency Procedure.

According to the results of control column (1), the difference between the LTV of movables and immovables-collateralized loans is 27.6 percentage points higher in strong-law countries than in weak-law countries. The economic significance is large: compared with the unconditional mean LTV for movables in weak-law countries of 0.454, the results represent an increase in LTV of 60.8% (=0.276/0.454). In column (2) we add sector fixed effects to absorb sectoral differences in the use of collateral and LTVs and the results remain unchanged. In column (3) we control for other country variables and the movable law coefficient decreases slightly in magnitude but remains highly significant. The effects of *Rule of Law, Property Rights,* and *Time to Enforce a Contract* are not significant, while the effect of *Time to Enforce Insolvency* is negative and marginally significant: the LTV of movable collateral, relative to immovable collateral, is lower in countries with inefficient bankruptcy procedures. Overall, these results imply large loan-supply effects associated with strong-law status, which are more pronounced for movable-collateralized loans.

[Insert Table 2 here]

The results reported likely understate the degree to which loan supply is affected by movable collateral laws for two reasons. First, in the absence of a good legal framework for collateralized lending against movable assets, the composition of borrowers is likely to shift toward more seasoned credit risks that are less dependent on collateral. As a result, the LTVs of movable-backed loans in weak-law countries will tend to be affected by the unobservable better fundamental credit risk, which acts to diminish the observed differences in LTVs on loans collateralized by movable assets for strong- and weak-law countries. Second, improvements in collateral laws not only should increase LTVs, they also should increase the price of movable assets pledged as collateral. Therefore, our results on LTV provide a conservative estimate of the effects of collateral law on lending supply. Given the structure of our dataset, we are not able to observe changes in the liquidation values of particular assets. We can say, however, that the collateral price effect will unambiguously bias our estimates toward zero.

As we discussed in Section II, the Slovakian reform in 2003 dramatically shifted the ability to collateralize movables. This enables us to perform a within-borrower analysis of the effect of this reform on movables lending in that country. To do so, we run the following difference-in-differences estimation:

$$LTV_{it} = \alpha_i + \alpha_t + \beta Post_t * Movable_i + \gamma Z_{it} + \varepsilon_{it},$$

where LTV_{it} is the loan-to-value for a loan made to firm i in quarter t and $Post_t$ is a reform indicator variable that takes the value of 1 after January 1st 2003 and 0 otherwise. Each firm included in the sample appears once in both the pre-reform and post-reform period.[27] The specification includes a full set of firm fixed effects (α_i) and quarterly time fixed effects (α_t). We are interested in the coefficient β, which is identified from the within-firm variation across time. The coefficient measures the difference between LTVs of loans collateralized by movable and immovable assets after the reform, relative to the same difference before the reform. We include time-varying borrower-level characteristics, Z_{it}, to control for differences in the supply of collateral.[28]

Table 3 reports the estimation results for Slovakia. Column (1) reports the results without firm fixed effects for reference. According to column (2), the difference between the LTVs of movable- and immovable-backed loans increases by 20.1 percentage points after the passage of the law.[29] The average LTV for movables (immovables) in Slovakia was 0.672 (0.876) prior to the reform. Hence, the results suggest that the pre-reform difference in LTVs across immovables and movables almost entirely disappeared post reform. The magnitude of the coefficient in Table 3 (0.201) is similar to the comparable coefficient estimate from the cross-sectional regression in Table 2 (0.276).

[Insert Table 3 here]

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[27] As before, we use only the first loan observed in each period.

[28] We cluster standard errors at the firm level.

[29] The *Movable* indicator varies at the firm level and is therefore absorbed by the firm fixed effects in the specifications of columns (2)-(4).

The third column in Table 3 reports a placebo test using the experience of the Czech Republic. We falsely assume that this country reformed its movable collateral law at the same time than Slovakia. The Czech Republic is the natural placebo candidate because both countries shared a legal environment historically and they planned to enter the EU at the same time. The coefficient on the interaction term is statistically insignificant in column (2), which shows that our results for Slovakia are not driven by other policies shared by the two countries that are unrelated to movable collateral reform. The last column reports an additional placebo test for the remaining countries in the GlobalBank sample, which did not implement collateral reforms during the sample period. Here we verify that there was no general worldwide change in GlobalBank's lending rules for loans collateralized by movables after January 1, 2003. The interaction term in column (3) is also statistically insignificant, indicating that our results are not driven by worldwide changes in GlobalBank's lending rules or by global shocks affecting movable relative to immovable collateral.

V. Movable Collateral Laws and GlobalBank's Lending: Additional Results

A. Movable Collateral Law Components

The MC Law Index measures the strength of movable collateral laws in all three components of secured transactions: creation, monitoring, and enforcement. In this section, we analyze which of these components matter the most. In column (1) of Table 4, we focus on differences in the creation component across countries, which reflect differences in the existence of laws permitting the collateralization of movable assets.[30] Although the effect is positive, it is not statistically significant. Column (2) focuses on differences in monitoring, in particular it compares countries with and without electronic collateral registries. The results show that the LTV of movable collateral, relative to immovable collateral, is higher in countries with collateral registries in place. According to column (3), the LTV of movable relative to immovable collateral is higher in countries that allow creditors to repossess collateral without court

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[30] The creation component corresponds to questions 1-5 of the MC Law Index. We sum these five questions for each country and create a dummy variable equal to 1 if the sum is above the median sum across countries and 0 otherwise.

intervention.[31] Column (5) shows that when we include all three components simultaneously, only the perfection and enforcement components are significant. In sum, the existence of collateral registries and the possibility of out-of-court enforcement – not the mere existence of laws – drive our results.

In column (4) of Table 4 we consider whether our results for out-of-court enforcement of movables collateral may reflect aspects of a country's legal system that apply to immovable assets, as well. To consider that possibility, we constructed an indicator variable for whether the countries in our sample permitted the out-of-court seizure of immovable collateral.[32] As column (4) shows, out-of-court enforcement for immovables does not enter significantly in the regression, and its presence does not affect our results for the importance of out-of-court seizure of movable assets. We interpret this as reflecting the greater importance of timely seizure of movable assets, which – unlike real estate – can depreciate quickly or disappear if they are not seized promptly.

[Insert Table 4 here]

B. Supra-Collateral Analysis

Supra collateral insulates loan contracts from local legal imperfections, either through a foreign enforcement of a foreign payment, a foreign-enforced guarantee, or a domestic right of setoff that does not depend on movable collateral laws. The LTVs for Supra collateral lending are similar across strong- and weak-law countries, although they are slightly higher in weak-law countries (83% versus 79%, the difference is statistically insignificant). This suggests that, compared to the effect of the legal environment on movables lending, there is less of an effect of the legal environment on Supra collateral lending.

To analyze the effects of collateral laws on the LTVs for Supra collateral loans, we estimate:

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[31] Seven of the 12 GlobalBank countries and 40 of the 76 extended-sample countries permit out-of-court enforcement for movable collateral (see Appendix Table A.6).

[32] To construct this indicator, we relied on data in Djankov et al. (2008). We measure out-of-court enforcement for immovables using the question of the survey on whether a country allows for an out-of-court procedure for real estate collateral. We collected data from Deloitte (2013) and Lex Mundi (2012) for our sample countries not included in Djankov et al. (2008). The indicators for out-of-court enforcement of movables and immovables are positively correlated (0.44 in the GlobalBank sample, and 0.36 in a broader sample of 30 countries, which we employ further in Table 10 below).

$$LTV_i = \alpha_c + \beta_1 Movable_i + \beta_2 Supra_i + \gamma_1 Law_c * Movable_i + \gamma_2 Law_c * Supra_i + \delta Z_i + \varepsilon_i,$$

where $Supra_i$ is an indicator variable equal to 1 if the loan is collateralized by Supra collateral and 0 otherwise. The coefficient of interest is now γ_2, which measures the difference between LTVs of loans collateralized by Supra and immovable assets in strong-law countries, relative to the same difference in weak-law countries.

The results reported in Table 5 for the difference between movable-collateralized and immovable-collateralized loans are consistent with earlier findings. As before, loans backed by movables in strong-law countries have LTVs that are 27.6 percentage points higher than loans backed by immovables, relative to weak-law countries (column 2). We find that the difference between the LTVs of Supra and immovable-backed loans is 8.3 percentage points lower in strong-law countries than in weak-law countries. This result implies that while Supra collateral captures a higher LTV than immovable assets in weak-law countries, this effect is overturned in strong-law countries. This likely reflects the fact that countries with weak collateral laws for movables also suffer from a relatively lower ability to collateralize against immovables. It seems that borrowers in weak-law countries tend to have weaker borrowing options against all non-Supra collateral, which pushes LTV ratios for Supra loans higher than in strong-law countries.

[Insert Table 5 here]

C. Robustness Checks

Table 6 reports various robustness tests of our LTV results in Table 2. In column (1), we employ a continuous measure of the MC Law Index as our measure of *Law*, rather than an indicator variable. Although the coefficient's size is different (consistent with the change in the mean of the regressor), results remain highly significant. Columns (2) and (3) show that Table 2's results are invariant to omitting accounts receivable or machinery from our definition of movable assets. Results are somewhat larger when machinery is omitted (in column 3), although the difference is not statistically significant. The

larger coefficient magnitude for non-machinery movables may reflect selectivity bias in favor of higher-quality borrowers who use machinery as collateral, given that less creditworthy firms have a greater tendency to lease machinery (Eisfeldt and Rampini, 2009). Column (4) confines the loan sample to manufacturing firms (the subject of Section VI below) and finds no significant difference in coefficients.

[Insert Table 6 here]

Table 7 explores whether dividing countries into finer categories (rather than above- and below-median levels of the MC Law Index) affects our LTV results. Specifically, we divide countries into three groups, those with a low-MC Law Index (the omitted category), a *Middle-Law* group, and a *High-Law* group. We find that coefficients tend to be higher for the *High-Law* group than for the *Middle-Law* group. Similarly, for the other variable analyzed in the next section (manufacturing production share), we also find that much of the effects of *Law* is attributable to the differences between high-MC Law Index values and all others. To conserve space and in recognition of that fact, our subsequent tables divide countries according to *Law* by comparing the *High-Law* group to the rest of the sample.

[Insert Table 7 here]

VI. Movable Collateral Laws and the Sectoral Allocation of Resources

To analyze the real consequences of collateral laws, we examine how economic activity varies across sectors with different natural usage of immovable assets. As a way to identify the exogenous (technologically given) composition of assets across sectors, we employ data on sectoral asset composition for the U.S. Presumably, in the U.S., which enjoys an unusually good legal framework for the collateralization of movable assets through the U.C.C., differences in the asset composition of sectors is essentially unaffected by legal shortcomings in the ability to pledge movables as collateral. This approach is akin to the Rajan and Zingales (1998) approach for measuring sectoral external financial dependence and its effects on resource allocation, as well as the work of Buera et al. (2011) on the effects

of financing constraints on sectoral resource allocation and productivity in finance-dependent sectors.[33]

We will make the operating assumption that the sectoral *ranking* of immovable intensity is common across the U.S. and our sample of countries.

We construct a sectoral index of real estate intensity as the median of the average ratio of the value of land and buildings to total assets across publicly traded firms in the U.S. in each manufacturing sector, during the period 1984-1996.[34] Figure 2 reports the sectoral index for each of 22 two-digit manufacturing sectors in our sample. Clearly, there are large cross-sectoral differences in the usage of immovable assets within manufacturing sectors (roughly 6.5% in leather, 8.5% in machinery and equipment, 14.5% in furniture, and 16.5% in tobacco).

[Insert Figure 2 here]

Using UNIDO data, we calculate each sector's share in total output by dividing sectoral output by aggregate manufacturing output.[35] In order to match the time period used in the loan-level analysis, we average the sectoral shares between 2002 and 2004.[36] In Figure 3, we plot the MC Law Index against the output share of immovable-intensive sectors. We define sectors as immovable-intensive if they are above the median of the sectoral real estate intensity index. The figure shows that countries with weak collateral laws tend to allocate a greater fraction of their production towards immovable-intensive sectors.

[Insert Figure 3 here]

Weak-law countries allocate on average 67.7% of their production to sectors intensive in real estate, while strong-law countries allocate only 51.1%. The difference of 16.6 percentage points is

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[33] The Rajan and Zingales (1998) approach has been criticized by Fisman and Love (2004). The Fisman and Love critique of Rajan and Zingales' method for measuring external financial dependence, however, does not apply to our asset composition measure, since our measure focuses on asset composition, not internally generated funding, which Fisman and Love argue is likely to capture demand shocks.

[34] As explained in Campello and Giambona (2013), the 1984-1996 period is the only time frame for which Compustat decomposes the value of tangible assets into land and buildings (immovables) and machinery and equipment (movables).

[35] As mentioned above, UNIDO does not provide information for Pakistan and Sri Lanka. As a result, when analyzing our GlobalBank sample of countries, we are left with a sample of 10 countries.

[36] Consistent with the LTV analysis, we use UNIDO data in the pre-reform period only (2002) for Slovakia.

statistically significant at the 5%-level. To analyze the effect of collateral laws on the sectoral allocation of resources, we run the following regression:

$$Share_{sc} = \alpha_s + \beta Law_c * REI_s + \gamma X_c * REI_s + \varepsilon_{sc},$$

where $Share_{sc}$ is the ratio of sectoral output to total output of sector s in country c. REI_s is a dummy equal to 1 for sectors above the median of the sectoral index of real estate intensity and 0 otherwise. The specification includes a full set of sector fixed effects (α_s).[37] The coefficient of interest is β, which measures the difference between the sectoral share of output allocated to immovable-intensive sectors in countries with strong and weak collateral laws. Note that the regression is akin to a difference-in-differences estimation, in which we calculate the difference between resources allocated to sectors with different immovable intensities, between countries with different strengths of collateral laws. To account for the fact that other country characteristics might affect the sectoral allocation, we add to the specification the same set of country-level control variables used in Section IV.A; each interacted with the real estate intensity indicator.

Table 8 (columns 1-4) reports the sectoral regression results. The interaction term is negative and statistically significant. According to the results, the output share of the representative immovable-intensive sector in weak-law countries is 1.4 percentage points higher than in strong-law countries (column 1). This is a large effect. Recall that there are 11 immovable-intensive sectors in each of the 10 countries. The results imply that in the aggregate, weak-law countries allocate 15.4% more of their production to immovable-intensive sectors than strong-law countries (=1.4%*11). The effect is robust to controlling for other country characteristics related to the legal system more broadly, which we employed in Table 2 (based on the findings of Table A.3), such as the time to enforce a contract, the time to resolve

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[37] We do not include country fixed effects in the regression because the outcome variables are shares. Country fixed effects would affect all sectors within a country equally, which is not possible since by definition the shares sum up to one.

insolvency, the rule of law, and property rights (columns 2 and 3).[38] Table A.5 of the Appendix shows the same regressions for the allocation of sectoral employment. The results are the same: the share of workers employed in immovable-intensive sectors in weak-law countries is 14.3 percentage points higher than in strong-law countries.

[Insert Table 8 here]

Next we address endogeneity bias concerns related to reverse causality and omitted variables. To address the concern of reverse causality, we employ legal origin interacted with *REI* as an instrument for the interaction between *Law* and *REI*. In unreported results, we find that the first stage is strong. Specifically, we find that legal origin is ranked in terms of their positive influence on collateral law as follows: English (highest), German (middle), and French (lowest). Our IV results are reported in column (4) of Table 8. We find that the IV coefficient estimates are slightly larger in magnitude than the OLS results, but not statistically significantly so.

Next, in columns (5)-(8) of Table 8, we run the same four regressions as in columns (1)-(4), but with the sectoral investment rate (ratio of gross investment to output) as the dependent variable.[39] In theory, poor legal enforcement of movables collateral should bias production against the use of movables assets, resulting in lower capital-to-labor and lower capital-to-output ratios for industries that are intensive in movables. Although UNIDO does not report capital stock data, investment-to-output ratios should track capital-to-output ratios because, in the steady state, investment equals the sectoral output growth rate plus the sectoral depreciation rate on capital times the capital stock.[40] Column (5) shows that the

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[38] Claessens and Laeven (2003) argue that weaker property rights protections against the actions of competitors lead firms to invest more in tangible assets relative to intangible assets. The fact that our tests are robust to controlling for a measure of property rights ensures that our results are not reflecting these property rights differences.

[39] The only difference is that the investment-rate regressions include country fixed effects, because unlike the sectoral shares, the sectoral investment rates within a country do not sum up to one.

[40] Note that, on average, sectors that are movable-intensive will tend to have higher depreciation rates for capital, given that machinery, inventory, and accounts receivable depreciate faster than real estate. This means that our coefficients are biased toward zero, because the estimates implicitly assume that the sum of the sectoral growth rate and the sectoral depreciation rate on capital are identical across sectors.

investment rate in immovable-intensive sectors in weak-law countries is 3 percentage points higher than in strong-law countries. This result is robust to controlling for other variables and to the IV estimation.

Given the possibility that machinery (but not other movable assets) can be leased, we also considered whether our findings on sectoral resource allocation might differ according to differences within movables-intensive sectors in their relative intensity in their use of machinery, as opposed to other movables. For each sector, we constructed indices measuring their relative intensity in machinery or in other movables (accounts receivable plus inventory).[41] In Appendix Table A.4 we report results showing that the effect is slightly lower for machinery-intensive sectors, consistent with the ability to lease machinery. However, the difference is not statistically significant.

In addition, we examine how the change in movables collateral law in Slovakia affected the sectoral allocation of resources. Due to the relatively small sample size in this panel study (10 years and 22 sectors divided between pre- and post-reform periods) our standard errors are large and our coefficients are estimated imprecisely. The magnitude of the estimated sectoral shift, however, is economically large. In Figure 4, we plot the evolution of the share of production allocated in sectors with above-median real estate intensity. According to Panel A, before the 2003 reform, roughly 57% of Slovakia's manufacturing output was allocated in sectors that are intensive users of real estate. After the reform, this share decreases steadily, reaching nearly 52% by 2007. In Panel B, we show a similar graph for the average output share of immovable-intensive sectors in all countries except Slovakia. We can observe that the output share is roughly constant before and after 2003. Because none of these countries reformed their collateral laws during this period, this result suggests that the Slovakia results are not driven by shocks affecting immovable-intensive sectors after 2003.

[Insert Figure 4 here]

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[41] Specifically, we constructed a sectoral machinery intensity index and an accounts receivable plus inventory intensity index as the median of the average ratio of the value of machinery to total assets and the ratio of accounts receivable plus inventory to total assets across publicly traded firms in the U.S., respectively.

VII. Movable Collateral Laws and the Sectoral Allocation of Resources: Additional Results

A. Extended-Sample of Countries

We extend our analysis beyond the sample of the GlobalBank countries. Because the World Bank's *Doing Business* dataset on movable collateral law is available beginning in 2005, we collected UNIDO data for 2005-2010. To ensure consistent measurement of cross-country differences in the quality of collateral law, we excluded countries where jumps in the MC Law Index occur during 2005-2010.[42] There are 90 countries for which data are available from the UNIDO and *Doing Business* datasets. We drop three countries for which some sectoral output observations are missing and we also drop the U.S. given that our immovable-intensity indicator is calculated using U.S. data. We dropped 10 countries for which there was a jump in the MC Law Index. This leaves us with a sample of 76 countries.[43]

We report the results in Table 9. The results for output and investment are qualitatively similar to our results for the GlobalBank sample of countries, although the magnitudes of the estimates for the interaction term are somewhat smaller – roughly two-thirds the size of the previous estimate (=0.009/0.014). The estimates in column (1) of Table 9 imply that the output share of the representative immovable-intensive sector is 0.9 percentage points higher in weak-law countries than in strong-law countries. This estimate implies that in the aggregate, weak-law countries allocate 9.9% more of their output to immovable-intensive sectors than strong-law countries (=0.9%*11). In column (4) of Table 9, we report the IV results. As before, IV magnitudes tend to be larger, but not different from OLS estimates at a high level of statistical significance. According to column (5), the investment rate in immovable-intensive sectors in weak-law countries is 1.4% higher than in strong-law countries.

[Insert Table 9 here]

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[42] To extend our sample backward in time – to the 12-country sample period of 2002-2004 – would have required us to verify by hand (as we did for the 12 countries) that no changes in collateral law had occurred during 2002-2004 for the 90 countries in our sample. Doing so would have been impractical for many of the countries in the UNIDO sample, due to lack of information. We define a jump as a change of two or more units in the MC Law Index. Our results are robust to using a threshold of one or three units for defining a major jump.

[43] Table A.6 of the Appendix reports the list of the 76 countries.

B. Movable Collateral Law Components

Next, as in Section V.A, we analyze which components of the MC Law Index are driving the results. As before, we divide the MC Law Index into its three components: creation, monitoring, and enforcement. Columns (1)-(5) of Table 10 report the results for the sample of GlobalBank countries and columns (6)-(10) for the extended sample of 76 countries. The results are similar for both sample of countries (although as in Tables 8 and 9, magnitudes tend to be smaller for the extended sample) and are consistent with the results reported in Section V.A: the effects of the monitoring and enforcement components matter more than the creation component. We interpret this finding as indicating that collateral laws on the books, per se, are a necessary but not sufficient condition for effective collateralization. Having an electronic collateral registry to register security interests and allowing to enforce security interests out of court allows agents to use more effectively the collateral law on books. As in Table 4, we include a measure of out-of-court enforcement for immovables in columns (4) and (9) of Table 10, and we find, as in Table 4, that this variable does not enter significantly, and its inclusion does not affect the results for out-of-court enforcement of movables.

[Insert Table 10 here]

C. Movable Collateral Laws and Judicial Efficiency

Finally, we analyze how the effect of movable collateral laws varies with the degree of judicial inefficiency of an economy. As showed above, the ability to repossess collateral without having to go to court is one of the main factors through which collateral laws affect the sectoral allocation of resources. Therefore, we expect the effect of movable collateral laws to be stronger in those countries with inefficient judicial systems, where out-of-court enforcement is valued more. Moreover, if movable collateral laws merely were capturing omitted variables related more generally to the quality of the legal environment, then controlling for such differences would reduce the magnitude of movable collateral law effects.

We divide the extended sample of 76 countries into two groups: above and below the median value of the *Time to Enforce a Contract* variable. In column (2) of Table 11, we re-estimate the sectoral output regression for the above-median judicial inefficiency countries. The magnitude of the interaction term is large in magnitude and highly significant. For the below-median (relatively efficient) judicial countries (column 3), the effect is small and not significant. A Chow Test rejects the null hypothesis of equal coefficients across samples at the 1% level. This implies that out-of-court enforcement is working as a substitute for an inefficient judicial system. This also provides further evidence contrary to the view that the importance of movables collateral laws reflects omitted variables bias.

[Insert Table 11 here]

VIII. Conclusions

In this paper, we highlight the importance of movable assets, as opposed to real estate assets, in providing debt capacity for firms. Our paper is the first to connect differences in the legal environments across countries with respect to movable collateral to the lending behavior of a global bank. We use a novel cross-country micro-level dataset that has the unique feature of providing information regarding asset liquidation values, which allows us to construct meaningful loan-to-value ratios for loans collateralized by different types of assets. Our paper is also the first to show that collateralization laws in emerging market countries that discourage the use of movable assets as collateral create distortions in the allocation of resources that favor immovable-based production.

We find that differences across countries in their legal systems' ability to support the use of movable assets as collateral for bank loans substantially affect the ability of borrowers to gain access to credit. The consequences for reduced lending and constrained LTV ratios also are reflected in important differences in production. In countries with poorly developed movable collateralization laws, firms in sectors that exogenously rely more on movable assets in the production process tend to see a shrinkage in their shares of production, compared to other firms. These effects are all economically large as well as

statistically significant. Our study has important implications for understanding how legal system deficiencies – specifically, the absence of effective means of collateralizing movable assets – can shape bank loan supply, as well as firms' choices of asset composition, and the sectoral distribution of economic activity.

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Figure 1: Collateral Law Strength and the Difference in Loan-to-Value of Immovable- and Movable-Backed Loans

The figure plots the relationship between a country's movable collateral law index and the difference between the average loan-to-value (LTV) of GlobalBank's loans backed by immovable assets (real estate) and movable assets (machinery, inventory, and accounts receivable). The average is taken during the period 2002-2004.
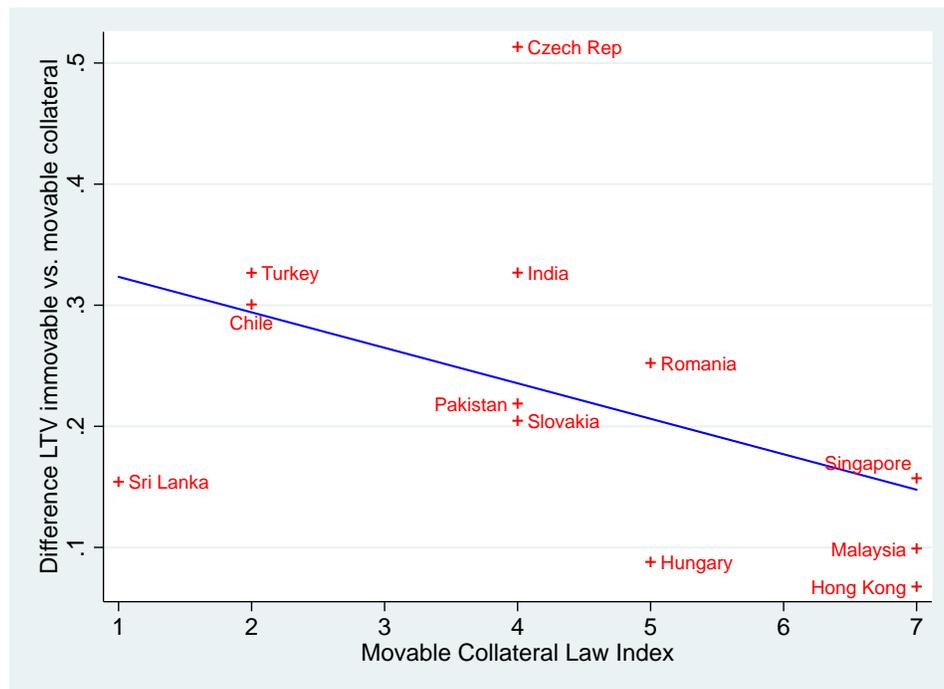
Figure 2: Sectoral Index of Real Estate Intensity

The figure plots the sectoral index of real estate intensity for the 22 two-digit manufacturing sectors in the sample (International Standard Industrial Classification, Revision 3). The index is calculated as the median of the average ratio of the value of land and buildings to total assets across publicly traded firms in the U.S. in each manufacturing sector during the period 1984-1996.
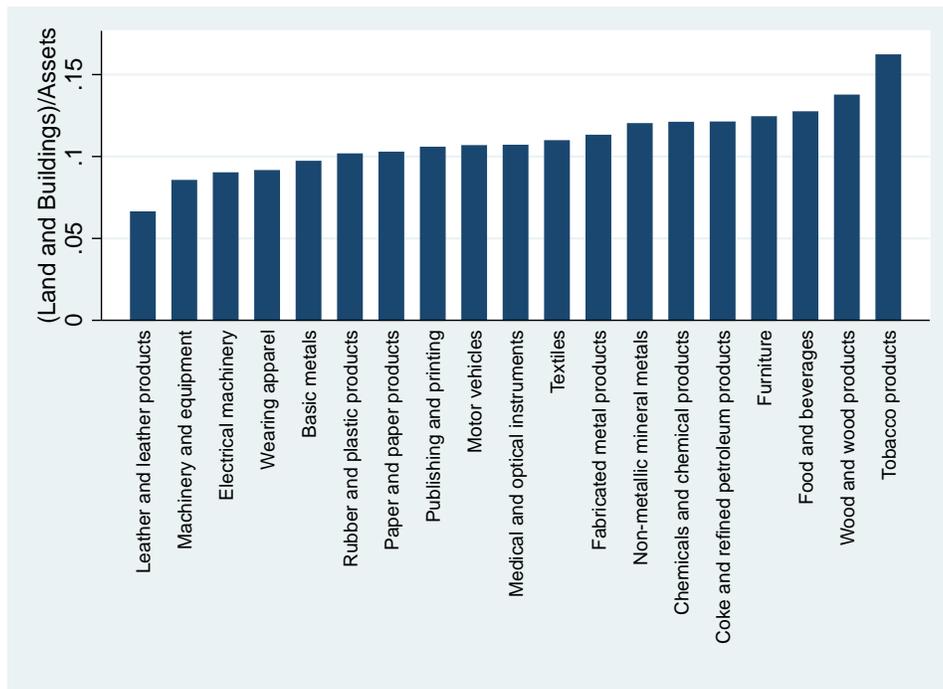
Figure 3: Collateral Law Strength and the Sectoral Allocation of Output

The figure plots the relationship between a country's movable collateral law index and the average ratio of output in immovable-intensive sectors to total manufacturing output. The sectoral data comes from UNIDO, which includes all firms operating in each sector. The average is taken during the period 2002-2004. Immovable-intensive sectors are those above the median of the sectoral index of real estate intensity.
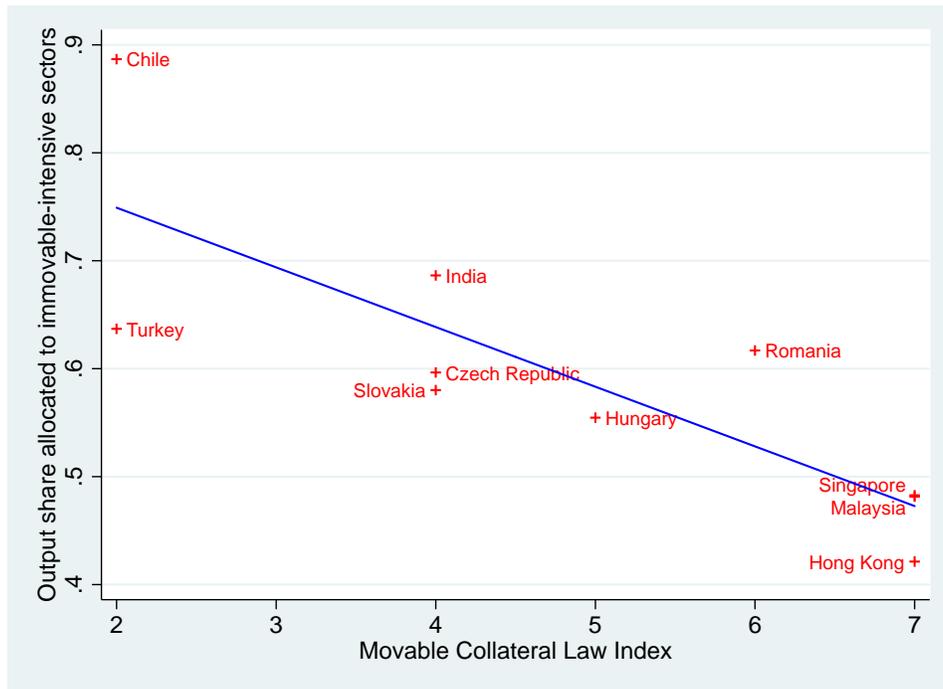
Figure 4: Evolution of Sectoral Allocation of Output and Employment in Slovakia and Other Countries

The figure plots the evolution of the ratio of output in immovable-intensive sectors to total manufacturing output in Slovakia (panel A) and the average ratio in the other nine countries (panel B), during the period 1999-2007. The sectoral data comes from UNIDO, which includes all firms operating in each sector. Immovable-intensive sectors are those above the median of the sectoral index of real estate intensity. The vertical gray line depicts the year of the Slovakian collateral law reform (2003).
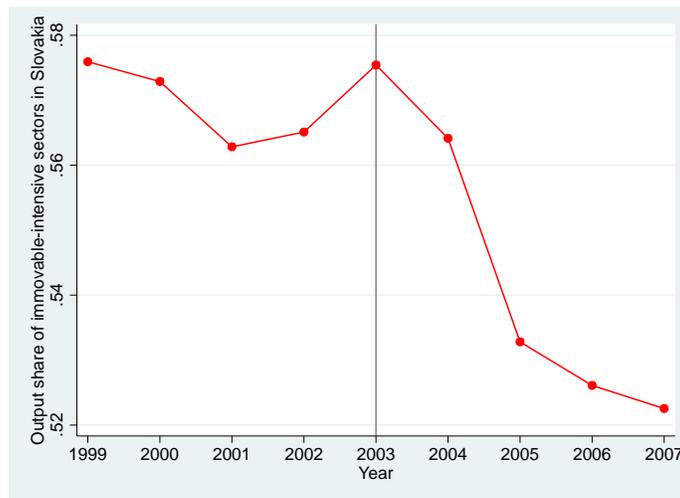
A. Sectoral Share of Output in Slovakia
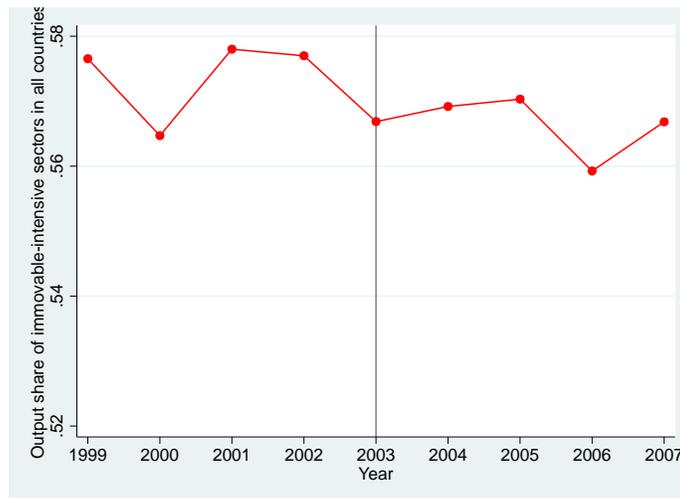
B. Sectoral Share of Output in Other Countries

Table 1: Loan-to-Value by Collateral Law Strength and Collateral Type

The table reports the average loan-to-value (LTV) for 4,224 borrowers from GlobalBank in 12 countries with weak and strong collateral laws, by collateral type. The average is taken during the period 2002-2004. Strong-law countries consist of countries above the median of the movable collateral law index. Collateral type is either *Immovable* (real estate) or *Movable* (machinery, inventory, and accounts receivable). There are 3,096 and 1,128 borrowers pledging immovable and movable assets, respectively.

	(1)	(2)	(3)	(4)	(5)
Collateral =	Immovable Assets		Movable Assets		Difference Immovable - Movable
	Obs.	LTV	Obs.	LTV	LTV
A. Weak-law countries					
Chile	244	0.783	16	0.482	0.301
Czech Republic	364	0.784	141	0.271	0.513
India	702	0.833	116	0.506	0.327
Pakistan	42	0.838	47	0.619	0.219
Slovakia	54	0.876	25	0.672	0.204
Sri Lanka	51	0.989	5	0.835	0.154
Turkey	251	0.804	178	0.477	0.327
B. Strong-law countries					
Hong Kong	989	0.928	420	0.861	0.068
Hungary	57	0.902	46	0.814	0.088
Malaysia	166	0.840	96	0.741	0.099
Romania	30	0.877	19	0.625	0.252
Singapore	146	0.894	19	0.737	0.157
C. Average weak- and strong-law countries					
Weak-law countries	1,708	0.817	528	0.454	0.364
Strong-law countries	1,388	0.912	600	0.827	0.085

Table 2: Effect of Collateral Laws on Loan-to-Value

This table presents the results from the following regression:

$$LTV_i = \alpha_c + \alpha_s + \beta Movable_i + \gamma Law_c * Movable_i + \delta Z_i + \lambda X_c + \varepsilon_i,$$

where LTV_i is the loan-to-value for a loan made by GlobalBank to firm i collateralized by assets that are either immovable or movable. Law_c is a dummy equal to 1 for countries above the median of the movable collateral law index and 0 otherwise. $Movable$ is a dummy variable equal to 1 if collateral is movable (machinery, inventory, and accounts receivable) and 0 otherwise. Z_i denotes a vector of firm-level controls. X_c is a vector of country-level controls (Time to Enforce a Contract, Time to Resolve Insolvency, Rule of Law, and Property Rights measured as dummy variables equal to one if above the median). The sample includes 4,224 borrowers in 12 countries during the period 2002-2004. The specification includes a full set of country fixed effects (α_c). Columns (2)-(3) also include sector fixed effects (α_s). The standard errors are clustered using block-bootstrapping at the country level.

Dep. Variable: LTV	(1)	(2)	(3)	(4)
Movable	-0.358***	-0.359***	-0.291***	-0.361***
	(0.046)	(0.053)	(0.065)	(0.060)
Law x Movable	0.276***	0.277***	0.210***	0.238***
	(0.047)	(0.057)	(0.062)	(0.063)
Time Enforcement x Movable			0.015	
			(0.055)	
Time Insolvency x Movable			-0.121*	
			(0.071)	
Rule of Law x Movable				0.062
				(0.045)
Property Rights x Movable				-0.013
				(0.041)
Firm Controls				
Firm Ratings	Yes	Yes	Yes	Yes
Firm Size	Yes	Yes	Yes	Yes
Balance Sheet Data (4 Ratios)	Yes	Yes	Yes	Yes
Fixed Effects				
Country	Yes	Yes	Yes	Yes
Sector	No	Yes	Yes	Yes
Observations	4,224	4,224	4,224	4,224
R-squared	0.50	0.51	0.51	0.51

Table 3: Effect of Slovakia's Collateral Law Reform on Loan-to-Value

This table presents the results from the following regression:

$$LTV_{it} = \alpha_i + \alpha_t + \beta Post_t * Movable_i + \gamma Z_{it} + \varepsilon_{it},$$

where LTV_{it} is the loan-to-value for a loan made by GlobalBank to firm i collateralized by assets that are either immovable or movable. $Movable$ is a dummy variable equal to 1 if collateral is movable (machinery, inventory, and accounts receivable) and 0 otherwise. $Post_t$ is a dummy equal to 1 after January 1st 2003, the implementation date for the Slovakia reform, and 0 otherwise. Z_{it} denotes a vector of time varying firm-level controls. To construct the pre- and post-reform samples we include all borrowers present in the pre-reform period and follow them post-reform. We include one observation per borrower in each of the pre- and post-reform periods. The sample in columns (1) and (2) is for borrowers in Slovakia only and includes 55 borrowers. The placebo sample in column (3) is for borrowers in the Czech Republic only and includes 261 borrowers. The placebo sample in column (4) includes borrowers from all countries excluding Slovakia and includes 2,018 borrowers. The main specification in columns (2)-(4) includes a full set of borrower fixed effects (α_i) and quarterly time fixed effects (α_t). The standard errors are clustered at the borrower level in columns (1)-(3) and clustered using block-bootstrapping at the country level in column (3).

Dep. Variable: LTV	(1)	(2)	(3)	(4)
		Sample		
			Czech	Excluding
	Slovakia		Republic	Slovakia
Movable	-0.203***			
	(0.033)			
Post x Movable	0.223***	0.201***	0.003	0.009
	(0.050)	(0.074)	(0.026)	(0.011)
Firm Controls				
Firm Ratings	Yes	Yes	Yes	Yes
Firm Size	Yes	Yes	Yes	Yes
Balance Sheet Data (4 Ratios)	Yes	Yes	Yes	Yes
Fixed Effects				
Borrower	No	Yes	Yes	Yes
Time	Yes	Yes	Yes	Yes
Observations	110	110	522	4,036
R-squared	0.37	0.79	0.89	0.80

Table 4: Effect of Collateral Law Components on Loan-to-Value

This table presents the results from the following regression:

$$LTV_i = \alpha_c + \alpha_s + \beta Movable_i + \gamma Law_c^{Component} * Movable_i + \delta Z_i + \varepsilon_i,$$

where LTV_i is the loan-to-value for a loan made by GlobalBank to firm i collateralized by assets that are either immovable or movable. $Law_c^{Component}$ denotes each of the three components of the movable collateral law index. *Creation* is a dummy equal to 1 for countries with the sum of the first five features of MC Law Index above the median and 0 otherwise; *Registry* is a dummy equal to 1 for countries with an electronic collateral registry and 0 otherwise; *Out-of-Court* is a dummy equal to 1 for countries that allow out-of-court enforcement for movables and 0 otherwise; *Out-of-Court Immov* is a dummy equal to 1 for countries that allow out-of-court enforcement for immovables and 0 otherwise. *Movable* is a dummy variable equal to 1 if collateral is movable (machinery, inventory, and accounts receivable) and 0 otherwise. Z_i denotes a vector of firm-level controls. The sample includes 4,224 borrowers in 12 countries during the period 2002-2004. The specification includes a full set of country fixed effects (α_c) and sector fixed effects (α_s). The standard errors are clustered using block-bootstrapping at the country level.

Dep. Variable: LTV	(1)	(2)	(3)	(4)	(5)
Movable	-0.257***	-0.355***	-0.364***	-0.364***	-0.321***
	(0.054)	(0.050)	(0.052)	(0.053)	(0.038)
Creation x Movable	0.060				-0.066
	(0.089)				(0.061)
Registry x Movable		0.278***			0.193***
		(0.052)			(0.061)
Out-of-Court x Movable			0.280***	0.252***	0.112***
			(0.056)	(0.052)	(0.038)
Out-of-Court Immov x Movable				0.038	
				(0.056)	
Firm Controls					
Firm Ratings	Yes	Yes	Yes	Yes	Yes
Firm Size	Yes	Yes	Yes	Yes	Yes
Balance Sheet Data (4 Ratios)	Yes	Yes	Yes	Yes	Yes
Fixed Effects					
Country	Yes	Yes	Yes	Yes	Yes
Sector	Yes	Yes	Yes	Yes	Yes
Observations	4,224	4,224	4,224	4,224	4,224
R-squared	0.51	0.51	0.51	0.51	0.51

Table 5: Effect of Collateral Laws on Loan-to-Value: Supra Collateral

This table presents the results from the following regression:

$$LTV_i = \alpha_c + \alpha_s + \beta_1 Movable_i + \beta_2 Supra_i + \gamma_1 Law_c * Movable_i + \gamma_2 Law_c * Supra_i + \delta Z_i + \varepsilon_i,$$

where LTV_i is the loan-to-value for a loan made by GlobalBank to firm i collateralized by assets that are immovable, movable, or supra collateral. Law_c is a dummy equal to 1 for countries above the median of the movable collateral law index and 0 otherwise. $Movable$ is a dummy variable equal to 1 if collateral is movable (machinery, inventory, and accounts receivable) and 0 otherwise. $Supra$ is a dummy variable equal to 1 if collateral is supra (bank guarantees, financial securities, and cash held with the bank) and 0 otherwise. Z_i denotes a vector of firm-level controls. The sample includes 4,691 borrowers in 12 countries during the period 2002-2004. The specification includes a full set of country fixed effects (α_c) and sector fixed effects (α_s). The standard errors are clustered using block-bootstrapping at the country level.

Dep. Variable: LTV	(1)	(2)
Movable		-0.359***
		(0.048)
Supra	0.106***	0.031
	(0.023)	(0.028)
Law x Movable		0.276***
		(0.050)
Law x Supra	-0.132***	-0.083**
	(0.027)	(0.031)
Firm Controls		
Firm Ratings	Yes	Yes
Firm Size	Yes	Yes
Balance Sheet Data (4 Ratios)	Yes	Yes
Fixed Effects		
Country	Yes	Yes
Sector	Yes	Yes
Observations	4,691	4,691
R-squared	0.22	0.46

Table 6: Effect of Collateral Laws on Loan-to-Value: Robustness Checks

This table presents the results from the following regression:

$$LTV_i = \alpha_c + \alpha_s + \beta Movable_i + \gamma Law_c * Movable_i + \delta Z_i + \varepsilon_i,$$

where LTV_i is the loan-to-value for a loan made by GlobalBank to firm i collateralized by assets that are either immovable or movable. Law_c is a dummy equal to 1 for countries above the median of the movable collateral law index and 0 otherwise. $Movable$ is a dummy variable equal to 1 if collateral is movable (machinery, inventory, and accounts receivable) and 0 otherwise. Z_i denotes a vector of firm-level controls. The sample for the main tests includes 4,224 borrowers in 12 countries during the period 2002-2004. The specification includes a full set of country fixed effects (α_c) and sector fixed effects (α_s). Column (1) employs the original movable collateral law index, which ranges from 0 to 7. Columns (2) and (3) examine alternative movables classifications by excluding accounts receivable (186 observations), and machinery (341 observations) respectively. Column (4) includes only manufacturing firms (1,655 observations). The standard errors are clustered using block-bootstrapping at the country level.

Dep. Variable: LTV	(1)	(2)	(3)	(4)
		Robustness		
	Alternative Collateral Law	Alternative Asset Classification		
		Inventory & Mach	Acct. Rec. & Inventory	Manufact. only
Movable	-0.535***	-0.309***	-0.381***	-0.323***
	(0.119)	(0.026)	(0.056)	(0.056)
Law x Movable	0.062***	0.232***	0.311***	0.206**
	(0.019)	(0.036)	(0.075)	(0.090)
Firm Controls				
Firm Ratings	Yes	Yes	Yes	Yes
Firm Size	Yes	Yes	Yes	Yes
Balance Sheet Data (4 Ratios)	Yes	Yes	Yes	Yes
Fixed Effects				
Country	Yes	Yes	Yes	Yes
Sector	Yes	Yes	Yes	Yes
Observations	4,224	4,038	3,883	1,655
R-squared	0.49	0.38	0.38	0.47

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Table 7: Effect of Collateral Laws: Alternative Divisions of Sample

This table presents results examining alternate cutoffs for the collateral law index from the following regression:

$$LTV_i = \alpha_c + \alpha_s + \beta Movable_i + \gamma_1 MiddleLaw_c * Movable_i + \gamma_2 HighLaw_c * Movable_i + \delta Z_i + \varepsilon_i,$$

where LTV_i is the loan-to-value for a loan made by GlobalBank to firm i collateralized by assets that are either immovable or movable. Collateral law strength is measured into three groups, where *Low Law* denotes a movable collateral law index of less than 5 (omitted coefficient), *Middle Law* denotes a movable collateral law index of 5 or 6, and *High Law* denotes a movable collateral law index of 7. *Movable* is a dummy variable equal to 1 if collateral is movable (machinery, inventory, and accounts receivable) and 0 otherwise. Z_i denotes a vector of firm-level controls. The sample includes 4,224 borrowers in 12 countries during the period 2002-2004. The specification includes a full set of country fixed effects (α_c) and sector fixed effects (α_s). The standard errors are clustered using block-bootstrapping at the country level.

	(1)	(2)
Dep. Variable:	LTV	
Movable	-0.358***	-0.336***
	(0.054)	(0.055)
Middle Law x Movable	0.238**	
	(0.095)	
High Law x Movable	0.281***	0.258***
	(0.060)	(0.060)
Firm Controls		
Firm Ratings	Yes	Yes
Firm Size	Yes	Yes
Balance Sheet Data (4 Ratios)	Yes	Yes
Fixed Effects		
Country	Yes	Yes
Sector	Yes	Yes
Observations	4,224	4,224
R-squared	0.50	0.49

Table 8: Effect of Collateral Laws on Sectoral Allocation of Output and Investment Rate: GlobalBank Sample

The table presents the results from the following regression:

$$Y_{sc} = \alpha_c + \alpha_s + \beta Law_c * REI_s + \gamma X_c * REI_s + \epsilon_{sc},$$

where Y_{sc} is either the average ratio of sectoral output to total manufacturing output of sector s in country c or the average ratio of gross fixed capital formation to output of sector s in country c. The average is taken during the period 2002-2004. Law_c is a dummy equal to 1 for countries with movable collateral law index above six and 0 otherwise. REI_s is a dummy equal to 1 for sectors above the median of the sectoral index of real estate intensity and 0 otherwise. X_c is a vector of country-level controls (Time to Enforce a Contract, Time to Resolve Insolvency, Rule of Law, and Property Rights measured as dummy variables equal to one if above the median). All specifications includes a full set of sector fixed effects (α_s) and specifications (4)-(6) also include a full set of country fixed effects (α_c). The sample consists of the 10 GlobalBank countries and 22 sectors. Columns (1)-(2) and (4)-(5) report the results using OLS. Columns (3) and (6) report the results using instrumental variables (IV), where the instrument for the interaction between Law and REI is the interaction between legal origin and REI. The standard errors are clustered using block-bootstrapping at the country level.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | | Output Share | | | | Investment Rate | | |
	OLS	OLS	OLS	IV	OLS	OLS	OLS	IV
Law x REI	-0.014***	-0.012*	-0.010*	-0.021**	-0.030**	-0.022*	-0.029*	-0.045*
	(0.003)	(0.005)	(0.004)	(0.008)	(0.013)	(0.013)	(0.014)	(0.021)
Time Enforcement x REI		0.001				-0.007		
		(0.002)				(0.004)		
Time Insolvency x REI		0.001				0.003		
		(0.002)				(0.002)		
Rule of Law x REI			0.005				0.007	
			(0.019)				(0.014)	
Property Rights x REI			0.001				0.001	
			(0.001)				(0.000)	
Fixed Effects								
Country	No	No	No	No	Yes	Yes	Yes	Yes
Sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Countries	10	10	10	10	10	10	10	10
Observations	220	220	220	220	220	220	220	220
R-squared	0.376	0.368	0.443	0.374	0.539	0.600	0.505	0.533

Table 9: Effect of Collateral Laws on Sectoral Allocation of Output and Investment Rate: Extended Sample

The table presents the results from the following regression:

$$Y_{sc} = \alpha_c + \alpha_s + \beta Law_c * REI_s + \gamma X_c * REI_s + \epsilon_{sc},$$

where Y_{sc} is either the average ratio of sectoral output to total manufacturing output of sector s in country c or the average ratio of gross fixed capital formation to output of sector s in country c. The average is taken during the period 2002-2004. Law_c is a dummy equal to 1 for countries with movable collateral law index above six and 0 otherwise. REI_s is a dummy equal to 1 for sectors above the median of the sectoral index of real estate intensity and 0 otherwise. X_c is a vector of country-level controls (Time to Enforce a Contract, Time to Resolve Insolvency, Rule of Law, and Property Rights measured as dummy variables equal to one if above the median). All specifications includes a full set of sector fixed effects (α_s) and specifications (4)-(6) also include a full set of country fixed effects (α_c). The extended sample consists of 76 (52) countries for the output share (investment rate) regressions and 22 sectors. Columns (1)-(2) and (4)-(5) report the results using OLS. Columns (3) and (6) report the results using instrumental variables (IV), where the instrument for the interaction between Law and REI is the interaction between legal origin and REI. The standard errors are clustered using block-bootstrapping at the country level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Output Share				Investment Rate		
	OLS	OLS	OLS	IV	OLS	OLS	OLS	IV
Law x REI	-0.009***	-0.008**	-0.008**	-0.012*	-0.017**	-0.014	-0.019	-0.025*
	(0.004)	(0.003)	(0.003)	(0.007)	(0.008)	(0.009)	(0.019)	(0.012)
Time Enforcement x REI		0.001				-0.001		
		(0.002)				(0.005)		
Time Insolvency x REI		0.001				0.004		
		(0.001)				(0.002)		
Rule of Law x REI			0.007				0.007	
			(0.017)				(0.012)	
Property Rights x REI			0.000				0.001	
			(0.001)				(0.001)	
Fixed Effects								
Country	No	No	No	No	Yes	Yes	Yes	Yes
Sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Countries	76	76	76	76	52	52	52	52
Observations	1,672	1,672	1,672	1,672	1,144	1,144	1,144	1,144
R-squared	0.451	0.444	0.452	0.451	0.797	0.787	0.519	0.796

Table 10: Effect of Collateral Law Components on Sectoral Allocation of Output

The table presents the results from the following regression:

$$Share_{sc} = \alpha_s + \beta Law_c^{Component} * REI_s + \gamma X_c * REI_s + \epsilon_{sc},$$

where $Share_{sc}$ is the average ratio of sectoral output to total manufacturing output of sector s in country c. The average is taken during the period 2002-2004. $Law_c^{Component}$ denotes each of the three components of the movable collateral law index. *Creation* is a dummy equal to 1 for countries with the sum of the first five features of MC Law Index above the median and 0 otherwise; *Registry* is a dummy equal to 1 for countries with an electronic collateral registry and 0 otherwise; *Out-of-Court* is a dummy equal to 1 for countries that allow out-of-court enforcement for movables and 0 otherwise; ; *Out-of-Court Immov* is a dummy equal to 1 for countries that allow out-of-court enforcement for immovables and 0 otherwise. REI_s is a dummy equal to 1 for sectors above the median of the sectoral index of real estate intensity and 0 otherwise. The specification includes a full set of sector fixed effects (α_s). The sample of columns (1)-(3) consists of the 10 GlobalBank countries and 22 sectors. The sample of columns (4)-(6) consists of 76 countries and 22 sectors. The standard errors are clustered using block-bootstrapping at the country level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
			Original Sample					Extended Sample		
Creation x REI	-0.012				-0.005	-0.008***				-0.005
	(0.008)				(0.004)	(0.002)				(0.004)
Registry x REI		-0.017**			-0.009		-0.007***			-0.004
		(0.007)			(0.006)		(0.003)			(0.002)
Out-of-Court x REI			-0.015***	-0.012*	-0.007**			-0.005**	-0.004***	-0.003*
			(0.006)	(0.005)	(0.003)			(0.003)	(0.001)	(0.002)
Out-of-Court Immov x REI				0.008					0.001	
				(0.008)					(0.001)	
Fixed Effects										
Sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Countries	10	10	10	10	10	76	76	76	30	76
Observations	220	220	220	220	220	1,672	1,672	484	1,672	
R-squared	0.372	0.378	0.377	0.378	0.379	0.452	0.451	0.451	0.393	0.452

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Table 11: Effect of Collateral Laws on Sectoral Allocation of Output: Role of Judicial Inefficiency

The table presents the results from the following regression:

$$Share_{sc} = \alpha_s + \beta Law_c * REI_s + \epsilon_{sc},$$

where $Share_{sc}$ is the average ratio of sectoral output to total manufacturing output of sector s in country c. The average is taken during the period 2002-2004. Law_c is a dummy equal to 1 for countries with movable collateral law index above six and 0 otherwise. REI_s is a dummy equal to 1 for sectors above the median of the sectoral index of real estate intensity and 0 otherwise. The specification includes a full set of sector fixed effects (α_s). The sample in column (1) includes 76 countries and 22 sectors. Column (2) includes countries above the median of the variable Time to Enforce a Contract (42 countries). Column (3) includes countries below the median of Time to Enforce a Contract (34 countries). The standard errors are clustered using block-bootstrapping at the country level.

Dep. Variable: Share	(1) Full Sample	(2) Above-median Judicial Inefficiency	(3) Below-median Judicial Inefficiency
Law x REI	-0.009***	-0.013***	-0.005
	(0.003)	(0.004)	(0.005)
Fixed Effects			
Sector	Yes	Yes	Yes
Number of Countries	76	42	34
Observations	1,672	924	748
R-squared	0.451	0.449	0.476

Table A.1: Descriptive Statistics for GlobalBank Sample

The table reports descriptive statistics for loan-to-value (LTV) for 4,691 borrowers from GlobalBank in 12 countries, by collateral type. The average is taken during the period 2002-2004. Strong-law countries consist of countries above the median of the movable collateral law index. Collateral type is either *Immovable* (real estate), *Movable* (machinery, inventory, and accounts receivable), or *Supra*. There are 3,096, 1,128, and 467 borrowers pledging immovable, movable, and supra assets, respectively.

Panel A: Immovable Asset Collateral						
Country	Obs.	Mean	Median	Std Dev	25th	75th
Chile	244	0.783	0.735	0.136	0.726	0.888
Czech Republic	364	0.784	0.811	0.140	0.685	0.864
Hong Kong	989	0.928	0.952	0.092	0.935	0.992
Hungary	57	0.902	0.995	0.154	0.907	1.000
India	702	0.833	0.800	0.094	0.750	0.850
Malaysia	166	0.840	0.903	0.162	0.734	0.997
Pakistan	42	0.838	0.824	0.165	0.675	1.000
Romania	30	0.877	0.877	0.098	0.824	0.990
Singapore	146	0.894	0.986	0.148	0.829	1.000
Slovakia	54	0.876	0.855	0.098	0.778	0.995
Sri Lanka	51	0.989	0.992	0.012	0.973	1.000
Turkey	251	0.804	0.771	0.145	0.752	0.967
All	3,096	0.860	0.864	0.131	0.750	0.992

Panel B: Movable Asset Collateral						
Country	Obs.	Mean	Median	Std Dev	25th	75th
Chile	16	0.482	0.481	0.191	0.255	0.675
Czech Republic	141	0.271	0.175	0.220	0.113	0.315
Hong Kong	420	0.861	0.932	0.136	0.783	0.944
Hungary	46	0.814	0.868	0.193	0.767	0.924
India	116	0.506	0.378	0.311	0.203	0.828
Malaysia	96	0.741	0.874	0.268	0.309	0.938
Pakistan	47	0.619	0.854	0.372	0.177	0.988
Romania	19	0.625	0.723	0.173	0.527	0.824
Singapore	19	0.737	0.746	0.143	0.686	0.833
Slovakia	25	0.672	0.682	0.117	0.630	0.783
Sri Lanka	5	0.835	0.816	0.113	0.779	0.923
Turkey	178	0.477	0.452	0.192	0.342	0.593
All	1,128	0.652	0.748	0.295	0.342	0.928

Panel C: Supra-Collateral						
Country	Obs.	Mean	Median	Std Dev	25th	75th
Chile	69	0.840	1.000	0.235	0.671	1.000
Czech Republic	104	0.794	0.730	0.135	0.708	0.956
Hong Kong	4	0.814	0.950	0.306	0.647	0.981
Hungary	6	0.917	0.950	0.098	0.800	1.000
India	-	-	-	-	-	-
Malaysia	113	0.770	0.800	0.190	0.631	0.928
Pakistan	18	0.966	1.000	0.072	0.961	1.000
Romania	92	0.802	0.900	0.221	0.722	0.956
Singapore	35	0.796	0.820	0.181	0.666	0.969
Slovakia	23	0.832	0.910	0.178	0.771	0.997
Sri Lanka	-	-	-	-	-	-
Turkey	3	0.987	1.000	0.022	0.962	1.000
All	467	0.808	0.884	0.192	0.706	0.979

Table A.2: Frequency and Loan-to-Value by Collateral Type

The table reports the frequency of different types of collateral for the United States, based on the Survey of Small Business Finances (SSBF)*. The table also reports the frequency and average loan-to-value (LTV) for 4,224 borrowers from GlobalBank in 12 countries with weak and strong collateral laws, by collateral type. The average is taken during the period 2002-2004. Strong-law countries consist of countries above the median of the movable collateral law index. Collateral type is either *Immovable* (real estate) or *Movable* (machinery, inventory, and accounts receivable). There are 3,096 and 1,128 borrowers pledging immovable and movable assets, respectively. For the 1,128 movable asset loans, there are 341, 601, and 186 borrowers pledging machinery, inventory, and accounts receivable respectively.

	Immovable Assets		Machinery		Inventory+AR	
	Frequency	LTV	Frequency	LTV	Frequency	LTV
United States	37.03%	NA	45.69%	NA	17.27%	NA
GlobalBank Countries						
- Full Sample	73.10%	0.864	8.34%	0.736	18.56%	0.630
- Weak-law	76.39%	0.817	3.76%	0.653	19.86%	0.534
- Strong-law	69.82%	0.912	12.93%	0.819	17.25%	0.726

* Note on SSBF: The Survey of Small Business Finances, from the Federal Reserve Board, provides information on small businesses in the United States. We use the latest version available: 2003. SSBF has separate collateral information on six different types of loans, among which five (lines of credit, mortgages, motor vehicle loans, machinery loans, and other loans) can be secured. Up to three loans for each type can be reported in the survey, meaning a firm can report up to fifteen secured loans. We treat each loan as an individual observation, and focus only on secured loans that are collateralized by one type of asset class. To make a comparison with our study we examine inventory or accounts receivable, business equipment or vehicles, and real estate in the SSBF survey and estimate frequencies by dividing the number of each collateral type by the total number of the loans in that collateral class.

Table A.3: Effect of Collateral Laws on Loan-to-Value: Alternate Control Variables

This table presents the results from the following regression:

$$LTV_i = \alpha_c + \alpha_s + \beta Movable_i + \gamma X_c * Movable_i + \delta Z_i + \varepsilon_i,$$

where LTV_i is the loan-to-value for a loan made by GlobalBank to firm i collateralized by assets that are either immovable or movable. X_c is a vector of country-level controls: GDP per Capita, Private Credit to GDP, Rule of Law, Property Rights, Creditor Rights, Information Sharing, Time to Enforce a Contract, Time to Resolve Insolvency, and Cost of Insolvency Procedure, measured as dummy variables equal to one if above the median. $Movable$ is a dummy variable equal to 1 if collateral is movable (machinery, inventory, and accounts receivable) and 0 otherwise. Z_i denotes a vector of firm-level controls. The sample includes 4,224 borrowers in 12 countries during the period 2002-2004. The specification includes a full set of country fixed effects (α_c) and sector fixed effects (α_s). The standard errors are clustered using block-bootstrapping at the country level.

Dep. Variable: LTV	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Movable	-0.243***	-0.261***	-0.318***	-0.304***	-0.277***	-0.139***	-0.129*	-0.129**	-0.292***
	(0.050)	(0.049)	(0.060)	(0.060)	(0.040)	-(0.080)	(0.073)	(0.052)	(0.067)
GDP per Capita x Movable	0.060								
	(0.140)								
Credit to GDP x Movable		0.083							
		(0.119)							
Rule of Law x Movable			0.235***						
			(0.078)						
Property Rights x Movable				0.219**					
				(0.094)					
Creditor Rights x Movable					0.108				
					(0.107)				
Information Sharing x Movable						0.160			
						(0.110)			
Time Enforcement x Movable							-0.189**		
							(0.095)		
Time Insolvency x Movable								-0.256***	
								(0.078)	
Cost Insolvency x Movable									0.121
									(0.114)
Firm Controls									
Firm Ratings	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Size	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Balance Sheet Data (4 Ratios)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects									
Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,224	4,224	4,224	4,224	4,224	4,224	4,224	4,224	3,317
R-squared	0.43	0.44	0.48	0.48	0.44	0.46	0.47	0.49	0.45

A.3

Table A.4: Effect of Collateral Laws on Sectoral Allocation of Output: Alternative Sectoral Indices

The table presents the results from the following regression:

$$Share_{sc} = \alpha_s + \beta Law_c * SectoralIndex_s + \epsilon_{sc},$$

where $Share_{sc}$ is the average ratio of sectoral output to total manufacturing output of sector s in country c. The average is taken during the period 2002-2004. Law_c is a dummy equal to 1 for countries with movable collateral law index above six and 0 otherwise. *RealEstate Intensity*, *(AccRec+Inv) Intensity*, and *Machinery Intensity* are dummies equal to 1 for sectors above the median of the sectoral index of real estate intensity, (accounts receivable + inventory) intensity, and machinery intensity, respectively, and 0 otherwise. The specification includes a full set of sector fixed effects (α_s). The sample consists of the 10 GlobalBank countries. The standard errors are clustered using block-bootstrapping at the country level.

	(1)	(2)	(3)	(4)	(5)	(6)
Law x RealEstate Intensity	-0.014**			-0.025**	-0.022**	-0.027**
	(0.005)			(0.008)	(0.008)	(0.009)
Law x (AccRec+Inv) Intensity		0.015**		0.026**		0.021**
		(0.006)		(0.010)		(0.009)
Law x Machinery Intensity			0.011*		0.019**	0.010
			(0.006)		(0.008)	(0.007)
Fixed Effects						
Sector	Yes	Yes	Yes	Yes	Yes	Yes
Number of Countries	10	10	10	10	10	10
Observations	220	220	220	220	220	220
R-squared	0.376	0.376	0.373	0.398	0.391	0.401

Table A.5: Effect of Collateral Laws on Sectoral Allocation of Employment

The table presents the results from the following regression:

$$Share_{sc} = \alpha_s + \beta Law_c * REI_s + \gamma X_c * REI_s + \epsilon_{sc},$$

where $Share_{sc}$ is the average ratio of sectoral employment to total manufacturing employment of sector s in country c. The average is taken during the period 2002-2004. Law_c is a dummy equal to 1 for countries with movable collateral law index above six and 0 otherwise. REI_s is a dummy equal to 1 for sectors above the median of the sectoral index of real estate intensity and 0 otherwise. X_c is a vector of country-level controls (Time to Enforce a Contract and Time to Resolve Insolvency, measured as dummy variables equal to one if above the median). The specification includes a full set of sector fixed effects (α_s). The sample includes 10 countries and 22 sectors. The standard errors are clustered using block-bootstrapping at the country level.

	(1)	(2)	(3)	(4)	(5)	(6)
	Original Sample			Extended Sample		
	OLS	OLS	IV	OLS	OLS	IV
Law x REI	-0.013**	-0.014*	-0.019*	-0.009*	-0.007*	-0.022**
	(0.005)	(0.006)	(0.010)	(0.005)	(0.004)	(0.009)
Time Enforcement x REI		-0.001			-0.001	
		(0.002)			(0.002)	
Time Insolvency x REI		0.001			0.002	
		(0.002)			(0.001)	
Fixed Effects						
Sector	Yes	Yes	Yes	Yes	Yes	Yes
Number of Countries	10	10	10	66	66	66
Observations	220	220	220	1,289	1,289	1,289
R-squared	0.356	0.363	0.354	0.367	0.368	0.364

Table A.6: List of Countries in Extended Sample

The table reports the names of the 76 countries included in the extended sample of the sectoral analysis.

	Country	Out-of-court Enforcement Movables		Country	Out-of-court Enforcement Movables
1	Afghanistan	0	39	Jordan	1
2	Albania	0	40	Kenya	1
3	Argentina	0	41	Kyrgyz Republic	1
4	Armenia	1	42	Latvia	1
5	Australia	1	43	Lithuania	1
6	Austria	1	44	Macedonia	0
7	Azerbaijan	1	45	Madagascar	0
8	Botswana	1	46	Malaysia	1
9	Brazil	0	47	Mauritius	0
10	Bulgaria	1	48	Mexico	0
11	Cameroon	0	49	Morocco	0
12	Canada	0	50	Niger	0
13	Chile	0	51	Norway	1
14	China	0	52	Oman	0
15	Colombia	0	53	Paraguay	0
16	Congo	0	54	Peru	0
17	Costa Rica	0	55	Poland	1
18	Czech Republic	1	56	Portugal	0
19	Denmark	1	57	Puerto Rico	1
20	Ecuador	0	58	Republic of Korea	1
21	Egypt	0	59	Republic of Moldova	1
22	Eritrea	0	60	Russian Federation	0
23	Estonia	1	61	Senegal	0
24	Ethiopia	0	62	Singapore	1
25	Fiji	0	63	Slovakia	1
26	Finland	1	64	Slovenia	1
27	France	0	65	South Africa	1
28	Georgia	1	66	Spain	1
29	Germany	1	67	Sweden	0
30	Hong Kong	1	68	Thailand	1
31	Hungary	1	69	Tonga	0
32	Iceland	1	70	Tunisia	0
33	India	0	71	Turkey	0
34	Iran	0	72	Ukraine	1
35	Ireland	1	73	United Kingdom	1
36	Israel	1	74	Uruguay	1
37	Italy	0	75	Vietnam	1
38	Japan	0	76	Yemen	0