How Collateral Laws Shape Lending and Sectoral Activity[1]

Charles W. Calomiris, Mauricio Larrain, José Liberti, and Jason Sturgess

May 2015

Abstract

We investigate the effects of collateral laws for movable assets on lending and sectoral allocation. Using a unique cross-country micro-level loan dataset containing loan-to-value ratios for different asset classes, 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 output 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.

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 new evidence on one of the channels – collateral – through which law affects debt contracting, and in turn, credit supply and real economic activity.

We explore how the sophistication of a country's collateral laws regarding "movable" assets affects loan supply, both as reflected in the type of collateral pledged and in loan-to-value (LTV) ratios of each of the asset classes pledged. Movable assets consist of equipment, machinery, accounts receivable, and inventory. "Immovable" assets are real estate. 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 of the main advantages of the dataset is that it provides information regarding the liquidation value of the asset being pledged as collateral.[3] 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

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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] 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.

data on asset liquidation values. To the best of our knowledge, we are the first to study the role of LTVs for different asset classes as a measure of debt capacity.[4]

To understand better how law, through financing, shapes the real economy, we analyze how collateral laws affect the sectoral allocation of production. Because emerging market finance is typically bank debt, and is often collateralized, constraints on LTV and debt capacity should also constrain economic activity.[5] Specifically, we analyze how collateral laws affect the sectoral allocation of production between movables-intensive and immovables-intensive producers using sector-level output and employment data covering the universe of manufacturing firms in our sample of countries. Therefore, we connect differences in collateral laws to differences in the composition of assets and production in the economy.

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. Consequently, we are able to make meaningful comparisons across countries, because we are able to control for country-specific and lender-specific factors influencing collateral choice. 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 movables as 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

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[4] A notable exception is Ono et al. (2015), who study the effects of an LTV cap on real estate-based SME lending in Japan to draw implications on the use of LTV ratio caps as a macro-prudential policy measure.
[5] 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 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).

countries, but that LTVs for loans collateralized by immovable assets are similar across countries. According to our difference-in-differences estimation, in strong-law countries, LTVs of loans collateralized with movable assets are on average 27.6 percentage points higher than LTVs for loans collateralized by immovable assets, relative to the comparable difference in LTVs across movable and immovable assets in weak-law countries.

One concern in interpreting our cross-sectional regressions is the potential influence of an unobserved omitted factor that could explain the observed relationship between collateral laws and debt contracting. For most of the 12 countries in our lending sample, the legal framework relating to movables collateralization was constant during our sample period. However, one of the countries – Slovakia – improved its collateralization framework for movables during our sample period. To provide further causal evidence on the effects of collateral laws, we examine the lending behavior in Slovakia around the collateral law reform. Importantly, the reform allowed for the creation of security interests over movable assets without having to transfer possession to the creditor, dramatically expanding the scope of assets that could be used as collateral. Examining collateral use both within-country and within-borrower, we find that the LTVs for movable assets rose substantially after the policy reform, relative to immovable assets. The magnitude of this within-country change (20 percentage points) is similar to the magnitude of the cross-country difference between weak- and strong-law countries. This is reassuring as it indicates little potential omitted variables bias in the cross-sectional regressions.

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.[6] We can say, however, that the

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[6] We observe the value of collateral pledged, but we are not able to track the price changes of particular assets, nor are we able (with the exception of Slovakia) to investigate changes of any kind around moments of reform, which generally occur outside our time frame.

collateral price effect will unambiguously bias our estimates toward zero; increases in asset values would diminish LTVs if the supply of lending were not also affected by the change in collateral law.

To investigate the consequences of collateral laws on real economic activity, we study how collateral law differences affect the sectoral allocation of resources among manufacturing firms in a large sample of countries. Our measures of sectoral composition are taken from UNIDO data, which provides each country's sector-specific output and employment 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 collateral laws for movables. 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 of their production to immovable-intensive sectors than strong-law countries. Results for a broader sample of 76 countries are similar but of smaller magnitude (9.9%). We employ differences in legal origin as an instrument for differences in collateral laws, and find that the observed association between collateral law quality and sectoral allocation appears to be the result of exogenous variation in collateral laws. With respect to the real consequences of movable collateral law reform in Slovakia, we are also able to identify sectoral shifts in production in favor of movables-intensive producers after the reform.

Overall, our results show that collateralization laws in emerging markets that discourage the use of movables assets as collateral limit the ability of firms to raise financing and create distortions in the allocation of resources that favor immovable-based production. The increase in loan supply reflected in LTV ratios for loans collateralized with movable assets in strong-law countries, vis-à-vis weak-law countries, suggests a channel through which stronger collateral laws allow economies to expand credit to all production possibilities.

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 collateralization.[7] 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.[8] 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 (2014), 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.

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[7] 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), and Campello and Giambona (2013). 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).

[8] 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.

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 information on the assets pledged as collateral. Moreover, we extend their work by analyzing the consequences of movable collateral laws on aggregate economic activity.[9]

Finally, our paper also contributes to the broader literature that examines the 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.

The remainder of the paper is organized as follows. Section II discusses our data sources. Section III reports empirical findings related to GlobalBank's lending in 12 emerging market countries. Section IV provides additional evidence on a third category of GlobalBank lending, which we label "Supra" collateral, the reform in Slovakia, and robustness checks. Section V examines the effects on the sectoral allocation of resources. Section VI concludes.

<u>II. Data Sources</u>

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 allocations of production.

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[9] Love et al. (2013) 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 the 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 (equipment, 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).[10] 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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[10] 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 amount of the term loan 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 any discount due to asset fire sales or due to 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.[11] 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 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.[12]

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 by subsidiaries of GlobalBank in a foreign country or by other acceptable counterparty banks with good reputation and with

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[11] See Degryse et al. (2014) for an analysis 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.

[12] 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.

which GlobalBank has daily operations.[13] 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 movables collateral law index ("MC Law Index") for each country by summing the scores of seven of those components.[14] 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:

- 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.
- 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.
- 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.
- 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.
- Secured creditors are paid first (for example, before tax claims and employee claims) when a debtor defaults outside an insolvency procedure.
- 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.

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[13] 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.

[14] 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.

- The law allows parties to agree in a movable collateral agreement that the lender may enforce its security right out of court.

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."

In the results reported below, when we include Slovakia in the cross-sectional analysis of countries, we only include loan observations for the pre-reform period.[15] 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.

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[15] There may have been adjustment lags in credit-supply improvements in Slovakia in response to the movable collateral law improvements of 2003. For that reason, we chose to include data only for Slovakia's pre-reform period, which fully reflects the influence of its preexisting legal rules.

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 (and also on employment and number of establishments), measured in U.S. dollars. 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 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 the World Bank data to construct our MC Law Index score for the countries included in this larger sample.

III. Movable Asset Collateral Laws and GlobalBank's Lending

We start the analysis by calculating the fraction of total GlobalBank loans collateralized by immovable assets in each country.[16] For each of the 12 countries in our sample, we calculate the frequency of immovables-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 immovables-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 LTV between GlobalBank loans collateralized by immovable and movable

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[16] In Appendix A.1, we report detailed descriptive statistics on the number and LTVs of loans made by GlobalBank, by country and collateral type.

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 movables-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 assets the average LTVs for the two groups are very different (0.454 versus 0.827). 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. These patterns show that the ability to collateralize loans against immovable assets is similar across countries. 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 movables-backed loans.

[Insert Table 1 here]

In order to test the effect of movable collateral laws on LTVs, we run the following difference-in-differences estimation:

$$LTV_i = \alpha_c + \beta Law_c + \gamma Movable_i + \delta Law_c * Movable_i + \theta X_i + \varepsilon_i,$$

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.[17] The coefficient on *Law* measures the common effect of collateral law on both movables and immovables lending. *Movable_i* is a movable indicator variable that takes the value 1 if the loan is collateralized by a movable asset and 0 otherwise. The specification includes a full set of country fixed effects (α_c).[18] The coefficient of primary interest is δ, 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. Finally, we include borrower-level characteristics to control for differences in the supply of collateral. X_i includes the bank's internal measure of firm size[19], 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.

Table 2 reports the LTV regression results, for different fixed effects specifications. The *Law*Movable* interaction term is positive, large, statistically significant, and stable across all three specifications. The *Law* term is also positive and statistically significant, indicating that LTVs are lower in weak-law countries even for loans collateralized by immovables. We recognize, however, that it is possible that the *Law* term might be picking up the effect of omitted country characteristics correlated with collateral law strength. For that reason, our preferred specification is column (3), which includes country fixed effects.[20] According to the results of column (3), 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

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[17] 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 IV.C).
[18] We cluster standard errors at the country level.
[19] 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.
[20] Because the *Law* term varies at the country level, the country fixed effects will absorb it.

LTV for movables in weak-law countries of 0.454, the results represent an increase in LTV of 60.8% (=0.276/0.454). These results imply large loan-supply effects associated with strong-law status, which are more pronounced for movables-collateralized loans.

[Insert Table 2 here]

The results reported likely understate the degree to which loan supply is affected by movable collateral laws. Because the reliance on collateralized loans tends to be greatest for relatively young and small firms, the inability to employ movable collateral should make it particularly difficult for young, unseasoned firms to qualify for loans. In other words, 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. For that reason, observed differences in LTVs will tend to be offset somewhat by unobservable contrary shifts in the quality of borrowers. As a result, the LTVs of movables-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.[21]

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

A. Supra-Collateral Analysis

Table 3 describes the relationship between Supra collateral lending by GlobalBank and the MC Law Index scores of countries. 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

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[21] In the regression results, we included an internal GlobalBank firm rating to control for firm heterogeneity. Surprisingly, excluding this variable had little effect on our results, which either indicates that unobserved cross-sectional heterogeneity is not very important, or that the GlobalBank firm rating does a poor job of capturing it.

legal environment on movables lending, there is less of an effect of the legal environment on Supra collateral lending.

[Insert Table 3 here]

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

$$LTV_i = \alpha_c + \beta Law_c + \gamma_1 Movable_i + \gamma_2 Supra_i + \delta_1 Law_c * Movable_i + \delta_2 Law_c * Supra_i + \theta X_i + \varepsilon_i,$$

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 δ_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 4 for the difference between movables-collateralized and immovables-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. We find that the difference between the LTVs of Supra and immovables-backed loans is 8.3 percentage points lower in strong-law countries than in weak-law countries. This result, combined with the descriptive statistics in Tables and 1 and 3, implies that while Supra collateral captures a higher LTV than immovable assets in weak-law countries, this effect is overturned in strong-law countries.

[Insert Table 4 here]

This likely reflects the fact that countries with weak collateral laws for movables also suffer from a relatively lower ability to collateralize against immovables. Recall that in Table 2, column (1), we found that in weak-law countries, loans collateralized by immovables have LTVs that are roughly 10.5 percentage points lower than in strong-law countries. It seems that borrowers in weak-law countries tend

to have weaker borrowing options against all non-Supra collateral, which pushes loan-to-value ratios for Supra loans higher than in strong-law countries.

B. Slovakia Reform Analysis

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

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

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.[22] 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 γ, 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, X_{it}, to control for differences in the supply of collateral.[23]

Table 5 reports the estimation results for Slovakia. According to column (1), the difference between the LTVs of movables and immovables-backed loans increases by 20.1 percentage points after the passage of the law. The average LTV for movables (immovables) in Slovakia was 0.672 (0.876) prior to the reform. Hence, the results suggest that the pre-form difference in LTV across immovables and movables almost entirely disappeared post reform. The magnitude of the coefficient in Table 5 (0.201) is similar to the comparable coefficient estimate from the cross-sectional regression in Table 2 (0.276). This is reassuring as it indicates little potential omitted variables bias in the cross-sectional regressions.

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[22] As before, we use only the first loan observed in each period.
[23] We cluster standard errors at the firm level.

The second column in Table 5 reports a placebo test for the Czech Republic, were 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 suggests that our results are not driven by other policies unrelated to movable collateral reform that increased the difference between LTVs backed by movable and immovable assets. 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. The idea is to verify that there were no general worldwide changes 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.

[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. Column (2) shows that Table 2's results are invariant to omitting accounts receivable, an intangible asset, from our definition of movable assets. Column (3) interacts the movable collateral indicator with country-level macroeconomic characteristics that might affect the loan-contracting environment. We include GDP per capita to ensure that our estimates are not reflecting differences in a country's level of economic development. Similarly, we include a variable from the World Bank on adherence to the rule of law in the country.[24] Our results are unaffected by controlling for

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[24] We obtained GDP per capita data from the World Bank's *World Development Indicators* and rule of law data from the World Bank's *Worldwide Governance Indicators*. We also tried controlling for other country

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these country characteristics. Column (4) confines the loan sample to manufacturing firms (the subject of Section V 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]

V. 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, differences in the asset composition of sectors is essentially unaffected by legal shortcomings in the ability to pledge movables as collateral.[25] 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

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characteristics, such as creditor rights, number of enforcement days, and financial development (measured as private credit to GDP). The results, which are available upon request, remain unchanged.

[25] Secured transactions over movable assets in the U.S. are governed by Article 9 of the Uniform Commercial Code (UCC).

constraints on sectoral resource allocation and productivity in finance-dependent sectors.[26] 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.[27] 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]

A. GlobalBank-Sample of Countries

Using UNIDO data, we calculate each sector's share in total output by dividing sectoral output by

aggregate manufacturing output.[28] We do the same for employment. In order to match the time period

used in the loan-level analysis, we average the sectoral shares between 2002 and 2004.[29] In Figure 3, we

plot the MC Law Index against the output share (Panel A) and employment share (Panel B) 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 resources towards immovable-intensive sectors.

[Insert Figure 3 here]

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[26] 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.
[27] 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).
[28] 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.
[29] Consistent with the LTV analysis, we use UNIDO data in the pre-reform period only (2002) for Slovakia.

In Table 8, we report the sectoral share of output (column 1) and employment (column 2) used in immovable-intensive sectors for countries with weak and strong collateral laws. We find that 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 statistically significant at the 5%-level. Similar results hold for employment. In weak-law countries, the share of employment used in immovable-intensive sectors is 14.1 percentage points higher than in strong-law countries (the difference is statistically significant at the 1%-level).

[Insert Table 8 here]

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 (or employment) to total output (or employment) 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).[30] The coefficient of interest is β, which measures the difference between the sectoral share of output (or employment) 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

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[30] 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.

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affect the sectoral allocation, we add to the specification the same set of country-level control variables used in Section IV.C; each interacted with the real estate intensity indicator.[31]

Table 9 reports the sectoral regression results. The interaction term is negative and statistically significant for both the output and employment regressions. 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. We obtain similar results for employment (column 4). In the aggregate, the fraction of workers employed in immovable-intensive sectors in weak-law countries is 14.3 percentage points higher than in strong-law countries (=1.3%*11).[32]

[Insert Table 9 here]

It is possible that an omitted country characteristic correlated with the quality of movable collateral law could be driving our results. Alternatively, it is possible that some exogenous country characteristic related to sectoral comparative advantage might influence the propensity to adopt good collateral law.[33] To partially address these concerns, we employ legal origin interacted with *REI* as an instrument for the interaction between *Law* and *REI*. The identifying assumption is that legal origin is only correlated with sectoral shares through its effect on collateral law. To measure legal origin, we rely on La Porta et al. (1997, 1998). In unreported results, we find that the first stage is strong. Specifically, we find that legal origins are ordinally ranked in terms of their positive influence on collateral law as

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[31] As before, we include GDP per capita to control for a country's level of economic development. Similarly, we control for adherence to the rule of law in the country, which can also affect sectoral allocation. Our results are robust to using other country controls, such as creditor rights, enforcement days, and financial development.

[32] Note that we focus on the sectoral allocation within manufacturing sectors. In unreported tests, we calculated the real estate intensity index for all sectors in the economy and found that the variation in the index across all sectors is roughly twice as large as the variation within manufacturing. This means that our sectoral results represent a lower bound of the true effect of collateral laws on the sectoral allocation of resources in the whole economy.

[33] Although these same concerns might arise in our LTV analysis reported above, our within-country analysis of Slovakia provides a means of dealing with endogeneity concerns.

follows: English (highest), German (middle), and French (lowest).[34] Our IV results are reported in columns (3) and (6) of Table 9. We find that the IV coefficient estimates are slightly larger in magnitude than the OLS results, but not statistically significantly so.

In constructing these IV estimates, we recognize that it is possible to object to our exclusion restriction. In particular, differences in legal origin have been shown to be associated with differences in levels of economic development and with differences in the quality of legal enforcement. However, as shown in column 2 of Table 9, when we control for GDP per capita and Rule of Law, neither of these variables plays a large or statistically significant role in predicting sectoral allocation.[35] Thus, even though we agree that it is conceivable that legal origin may influence sectoral allocation through its influence on the general level of economic development and the general quality of legal enforcement or property rights, it is reassuring to find that in practice it does not.

B. Extended-Sample of Countries

Next, 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.[36] There are 90 countries for which data are available from the UNIDO and *Doing Business* datasets. We drop

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[34] 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.

[35] 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. To ensure that our results for movable collateral law were not reflecting these property rights differences, we also ran a regression (not reported here) which is similar to the regression reported in column 2 of Table 9, but which also includes the interaction of REI with Claessens and Laeven's (2003) principal measure of property rights protections, which is the rating of protection of property rights from the Index of Economic Freedom constructed by the Heritage Foundation. Including the interaction of Property Rights with REI along with the interactions of REI with GDP per capita and Rule of Law has virtually no effect on the coefficient of the interaction of *Law* and REI.

[36] 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.

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.[37] Of these countries, only 66 report both output and employment data. UNIDO also provides information about the number of establishments operating in a sector. For the extended sample, 32 countries have additional data on the number of establishments.[38]

We report the results in Table 10. We find that the results for output are qualitatively similar to our results in Table 9, although the magnitude of the estimate for the interaction term is somewhat smaller – roughly two-thirds the size of the previous estimate (=0.009/0.014). The estimates in column (1) 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). The result is robust to including country control variables' interactions with sectoral immovable intensity. According to the results of column (4), the fraction of employees in the aggregate working in immovable-intensive sectors in weak-law countries is also 9.9 percentage points higher than in strong-law countries. Finally, column (7) shows that weak collateral laws also distort the allocation of resources at the extensive margin: the share of the number of establishments in immovable-intensive sectors in weak-law countries is 17.6 percentage points higher than in strong-law countries (=1.6%*11). As in Table 9, we also report IV results in Table 10. As before, IV magnitudes tend to be larger, but not different from OLS estimates at a high level of statistical significance.

[Insert Table 10 here]

The larger sample of countries contained in the UNIDO dataset permits us to perform an analysis of the relative importance of the various components of the MC Law Index. We divide the components

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[37] Table A.2 of the Appendix reports the list of the 76 countries.
[38] For the GlobalBank sample, only 4 of the 10 countries had data on the number of establishments, which prevented us from doing any meaningful analysis with this variable.

into three categories: *LawBook*, *Registry*, and *Enforcement*. *LawBook* contains the first five components of the MC Law Index, which refer to the existence of particular legal rights. *Registry* is the single component capturing the existence of a collateral registry. *Enforcement* is the single component capturing whether creditors can seize assets without having to participate in a court action. The results are reported in Table 11. We find that *LawBook* tends to have a smaller and less statistically significant effect.[39] We interpret this finding as indicating that collateral laws on the books, per se, are a necessary but not sufficient condition for effective collateralization. *Registry* and *Enforcement*, of course, presuppose the existence of at least some collateral laws for movable assets, but these variables also indicate that such laws can be used more effectively by market participants.

[Insert Table 11 here]

C. Sectoral Allocation Shifts in Slovakia

We also 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 and employment 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 53% by 2008. From Panel B, we can also observe a post-2003 decline in the fraction of employees working in immovable-intensive sectors, although the magnitude of the change is smaller. The smaller size of the change in employment likely reflects short-term rigidities in Slovakia's labor market.

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[39] Table 11 reports results for the three sets of components individually, in pairs, and all together. Because the three components are positively correlated, coefficient estimates in column (6) – where the three sets of components appear together — are smaller in magnitude and estimated less precisely.

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VI. Conclusions

Our paper is the first to connect differences in the legal environments across countries with respect to movables 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 movables 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, employment, and firm entry. In countries with poorly developed movables collateralization laws, firms in sectors that exogenously rely more on movable assets in the production process tend to see a shrinkage in their number and in their shares of production and employment, 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 (equipment, machinery, inventory, and accounts receivable). The average is taken during the period 2002-2004.
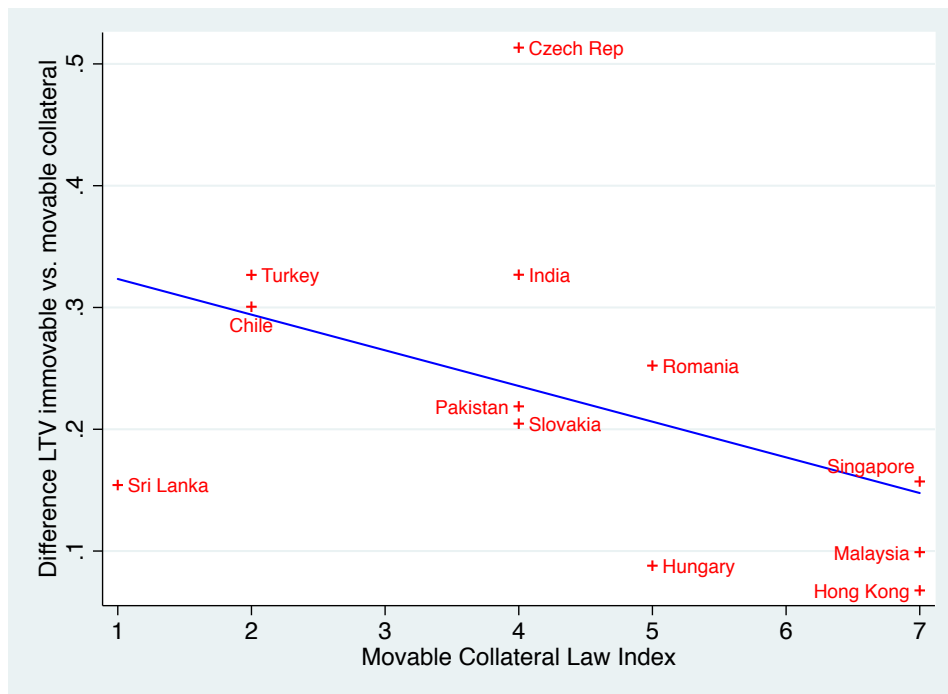
Figure 2: Sectoral Index of Real Estate Intensity

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.
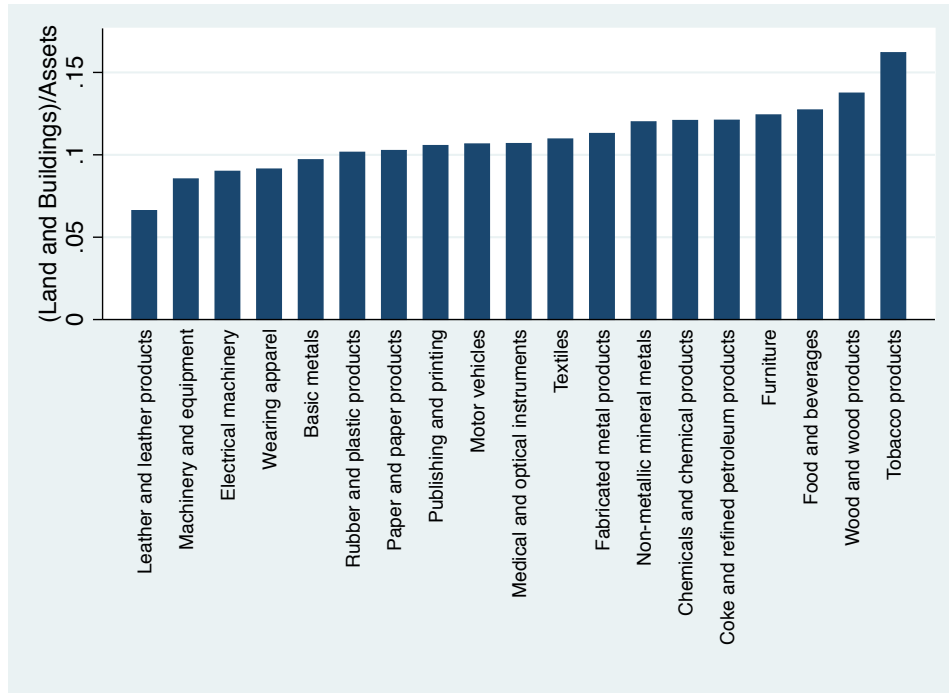
Figure 3: Collateral Law Strength and the Sectoral Allocation of Output and Employment

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 (panel A) and the average ratio of employment in immovable-intensive sectors to total manufacturing employment (panel B). 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.
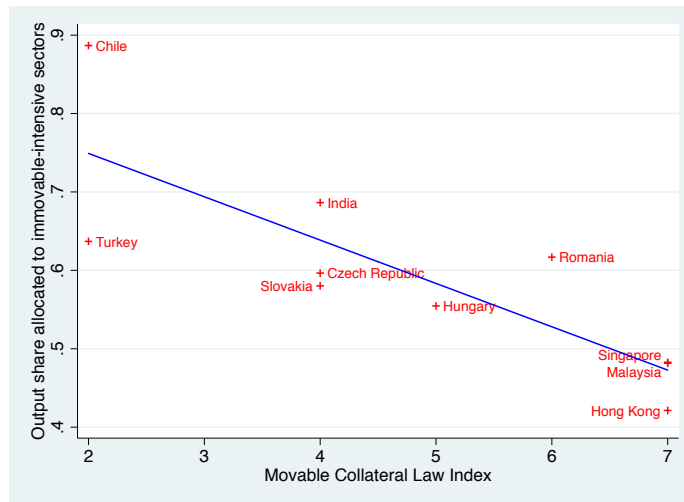
A. Sectoral Share of Output
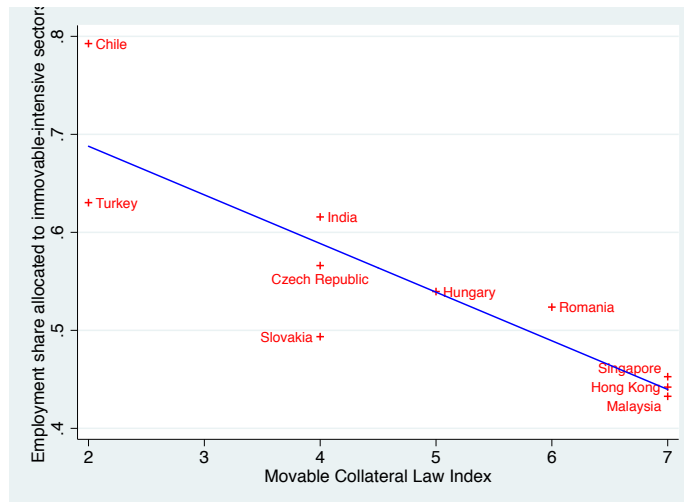
B. Sectoral Share of Employment

Figure 4: Evolution of Sectoral Allocation of Output and Employment in Slovakia

The figure plots the evolution of the ratio of output in immovable-intensive sectors to total manufacturing output (panel A) and the ratio of employment in immovable-intensive sectors to total manufacturing employment (panel B), in Slovakia during the period 1999-2008. 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).
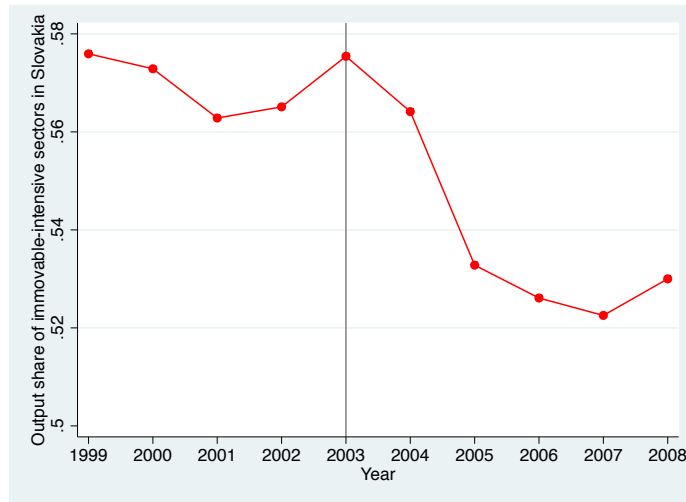
A. Sectoral Share of Output
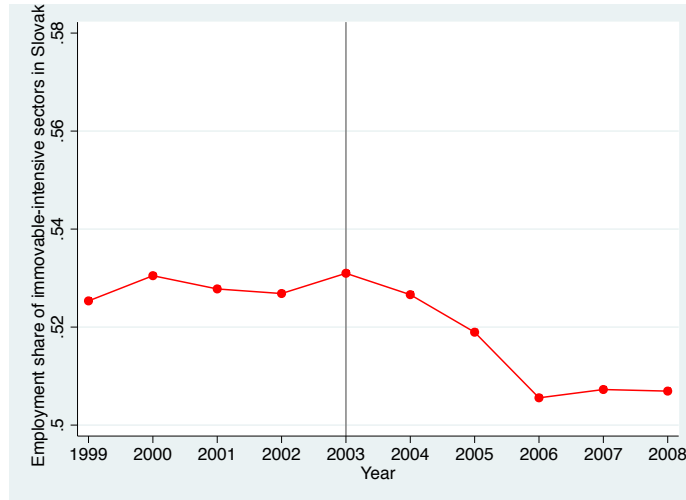
B. Sectoral Share of Employment

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* (equipment, machinery, inventory, and accounts receivable). There are 3,096 and 1,128 borrowers pledging immovable and movable assets, respectively.

	(1)	(2)	(3)
	Immovable Assets	Movable Assets	Difference Immovable - Movable Assets
Collateral =			
A. Weak-law countries			
Chile	0.783	0.482	0.301
Czech Republic	0.784	0.271	0.513
India	0.833	0.506	0.327
Pakistan	0.838	0.619	0.219
Slovakia	0.876	0.672	0.204
Sri Lanka	0.989	0.835	0.154
Turkey	0.804	0.477	0.327
B. Strong-law countries			
Hong Kong	0.928	0.861	0.068
Hungary	0.902	0.814	0.088
Malaysia	0.840	0.741	0.099
Romania	0.877	0.625	0.252
Singapore	0.894	0.737	0.157
C. Average weak- and strong-law countries			
Weak-law countries	0.817	0.454	0.364
Strong-law countries	0.912	0.827	0.085

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

This table presents the results from the following regression:

$$LTV_i = \alpha_c + \beta Law_c + \gamma Movable_i + \delta Law_c * Movable_i + \theta X_i + \varepsilon_i,$$

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 (equipment, machinery, inventory, and accounts receivable) and 0 otherwise. X_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) in columns (2) and (3). Column (3) also includes sector fixed effects. The standard errors are clustered at the country level.

Dep. Variable: LTV	(1)	(2)	(3)
Law	0.105***		
	(0.017)		
Movable	-0.354***	-0.358***	-0.358***
	(0.049)	(0.046)	(0.048)
Law x Movable	0.267***	0.276***	0.276***
	(0.051)	(0.047)	(0.049)
Firm Controls			
Firm Ratings	Yes	Yes	Yes
Firm Size	Yes	Yes	Yes
Balance Sheet Data (4 Ratios)	Yes	Yes	Yes
Fixed Effects			
Country	No	Yes	Yes
Sector	No	No	Yes
Observations	4,224	4,224	4,224
R-squared	0.45	0.50	0.51

Table 3: Loan-to-Value by Collateral Law Strength and Collateral Type: Supra Collateral

The table reports the average loan-to-value (LTV) of GlobalBank loans collateralized with supra-collateral for 467 borrowers in 10 countries with weak and strong collateral laws. The average is taken during the period 2002-2004. Strong-law countries consist of countries above the median of the movable collateral law index. *Supra* collateral consists of bank guarantees, financial securities, and cash held with the bank.

	LTV
A. Weak-law countries	
Chile	0.840
Czech Republic	0.794
India	-
Pakistan	0.966
Slovakia	0.832
Sri Lanka	-
Turkey	0.987
B. Strong-law countries	
Hong Kong	0.814
Hungary	0.917
Malaysia	0.770
Romania	0.802
Singapore	0.796
C. Average weak- and strong-law countries	
Weak-law countries	0.830
Strong-law countries	0.790

Table 4: Effect of Collateral Laws on Loan-to-Value: Supra Collateral

This table presents the results from the following regression:

$$LTV_i = \alpha_c + \beta Law_c + \gamma_1 Movable_i + \gamma_2 Supra_i + \delta_1 Law_c * Movable_i + \delta_2 Law_c * Supra_i + \theta X_i + \varepsilon_i,$$

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 (equipment, 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. X_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). Column (3) also includes sector fixed effects. The standard errors are clustered at the country level.

Dep. Variable: LTV	(1)	(2)	(3)
Movable		-0.357***	-0.359***
		(0.047)	(0.048)
Supra	0.106***	0.031	0.031
	(0.023)	(0.021)	(0.028)
Law x Movable		0.274***	0.276***
		(0.048)	(0.050)
Law x Supra	-0.132***	-0.085***	-0.083**
	(0.027)	(0.023)	(0.031)
Firm Controls			
Firm Ratings	Yes	Yes	Yes
Firm Size	Yes	Yes	Yes
Balance Sheet Data (4 Ratios)	Yes	Yes	Yes
Fixed Effects			
Country	Yes	Yes	Yes
Sector	No	No	Yes
Observations	4,691	4,691	4,691
R-squared	0.22	0.46	0.46

Table 5: Effect of Slovakia's Collateral Law Reform on Loan-to-Value

This table presents the results from the following regression:

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

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 (equipment, machinery, and inventory) 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. X_{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 column (1) is for borrowers in Slovakia only and includes 79 borrowers in the pre-reform period and only 55 borrowers post-reform. The placebo sample in column (2) is for borrowers in the Czech Republic only. There are 312 borrowers in the pre-reform and only 261 in the post-reform period. The placebo sample in column (3) includes borrowers from all countries excluding Slovakia. There are 2,565 borrowers pre-reform (out of the original 4,224) and 1,918 in the post-reform period. The specification 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)-(2) and the country level in column (5).

Dep. Variable: LTV	(1) Slovakia	(2) Sample Czech Republic	(3) Excl. Slovakia
Post x Movable	0.201**	0.003	0.009
	(0.081)	(0.027)	(0.009)
Firm Controls			
Firm Ratings	Yes	Yes	Yes
Firm Size	Yes	Yes	Yes
Balance Sheet Data (4 Ratios)	Yes	Yes	Yes
Fixed Effects			
Borrower	Yes	Yes	Yes
Time	Yes	Yes	Yes
Observations	134	573	4,483
R-squared	0.50	0.89	0.81

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

This table presents the results from the following regression:

$$LTV_i = \alpha_c + \beta Law_c + \gamma Movable_i + \delta Law_c * Movable_i + \theta X_i + \varepsilon_i,$$

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 (equipment, machinery, inventory, and accounts receivable) and 0 otherwise. X_i denotes a vector of firm-level controls. The sample for the main tests includes 4,429 borrowers in 12 countries during the period 2002-2004. The specification includes a full set of country fixed effects (α_c). Column (1) employs the original continuous collateral law index. Column (2) excludes accounts receivable from the movable asset definition (186 observations). Column (3) controls for the country-level characteristics GDP per Capita and Rule of Law. These controls are measured as dummy variable equal to one if the characteristic of interest is above the median. Column (4) includes only manufacturing firms (1,655 observations). The standard errors are clustered at the country level.

Dep. Variable: LTV	(1) Alternative Collateral Law	(2) Alternative Asset Classification	(3) Controlling for Country Characteristics	(4) Manufacturing only
	Robustness			
Movable	-0.535***	-0.309***	-0.360***	-0.323***
	(0.105)	(0.013)	(0.046)	(0.032)
Law x Movable	0.062***	0.232***	0.238***	0.206***
	(0.015)	(0.018)	(0.045)	(0.056)
GDP per Capita x Movable			-0.012	
			(0.011)	
Rule of Law x Movable			0.059*	
			(0.027)	
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
Observations	4,224	4,038	4,224	1,655
R-squared	0.45	0.38	0.49	0.45

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

This table presents results examining alternate cutoffs for the collateral law index for regressions estimating loan-to-value (LTV) as in Table 2. Collateral law strength is measured into three groups, where *LowLaw* denotes a movable collateral law index of less than 5 (omitted coefficient), *MiddleLaw* denotes a movable collateral law index of 5 or 6, and *HighLaw* denotes a movable collateral law index of 7. *LTV* is the loan-to-value for a loan made by GlobalBank collateralized by assets that are either immovable or movable. *Movable* is a dummy variable equal to 1 if collateral is movable (equipment, machinery, inventory, and accounts receivable) and 0 otherwise. The sample includes 4,224 borrowers in 12 countries during the period 2002-2004. The specification includes a full set of country fixed effects and sector fixed effects. The standard errors are clustered at the country level.

	(1)	(2)
Dep. Variable:	LTV	
Movable	-0.358***	-0.336***
	(0.048)	(0.049)
Middle Law x Movable	0.236***	
	(0.073)	
High Law x Movable	0.280***	0.258***
	(0.048)	(0.050)
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: Sectoral Allocation of Output and Employment by Collateral Law Strength

The table reports the average ratio of output in immovable-intensive sectors to total output (column 1) and the average ratio of employment in immovable-intensive sectors to total employment (column 2), by collateral law strength. The average is taken during the period 2002-2004 for 12 countries (except Pakistan and Sri Lanka). The sectoral data comes from UNIDO, which includes all firms operating in each sector. Strong-law countries consist of countries above the median of the movable collateral law index. Sectors intensive in real estate consist of sectors above the median of the sectoral index of real estate intensity.

	(1) Output	(2) Employment
A. Weak-law countries		
Chile	0.887	0.793
Czech Republic	0.596	0.566
India	0.686	0.616
Pakistan	-	-
Slovakia	0.571	0.489
Sri Lanka	-	-
Turkey	0.637	0.630
B. Strong-law countries		
Hong Kong	0.421	0.442
Hungary	0.555	0.540
Malaysia	0.483	0.433
Romania	0.617	0.524
Singapore	0.481	0.453
C. Average weak- and strong-law countries		
Weak-law countries	0.677	0.620
Strong-law countries	0.511	0.478
Difference	0.166	0.141

Table 9: Effect of Collateral Laws on Sectoral Allocation of Output and Employment

The table presents the results from the following regression:

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

where $Share_{sc}$ is the average ratio of sectoral output or employment, to total manufacturing output or employment, respectively, 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 (GDP per Capita and Rule of Law). 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 at the country level. Columns (1)-(2) and (4)-(5) report the results using OLS. Columns (3) and (6) report the results using IV, where the instrument for the interaction between collateral law strength and real estate intensity is the interaction between legal origin and real estate intensity.

Dep. Variable:	(1)	(2)	(3)	(4)	(5)	(6)
	Output Share			Employment Share		
	OLS	OLS	IV	OLS	OLS	IV
Law x REI	-0.014**	-0.014**	-0.021**	-0.013**	-0.014*	-0.019
	(0.005)	(0.006)	(0.008)	(0.005)	(0.007)	(0.011)
GDP per Capita x REI		0.000			-0.001	
		(0.003)			(0.003)	
Rule of Law x REI		-0.001			0.003	
		(0.006)			(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	0.374	0.356	0.356	0.354

Table 10: Effect of Collateral Laws on Sectoral Allocation of Output and Employment: Extended Sample

The table presents the results from the following regression for the extended sample:

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

where $Share_{sc}$ is the average ratio of sectoral output, employment, or number of establishments to total manufacturing output, employment, or number of establishments, respectively, of sector s in country c. The average is taken during the period 2005-2010. 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 (GDP per Capita and Rule of Law). The specification includes a full set of sector fixed effects (α_s). The sample includes 22 sectors. The samples for the output, employment, and establishments regressions include 76, 66, and 32 countries, respectively. The standard errors are clustered at the country level. Columns (1)-(2), (4)-(5), and (7)-(8) report the results using OLS. Columns (3), and (6), and (9) report the results using IV, where the instrument for the interaction between collateral law strength and real estate intensity is the interaction between legal origin and real estate intensity.

Dep. Variable:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Output Share			Employment Share			Establishments Share		
	OLS	OLS	IV	OLS	OLS	IV	OLS	OLS	IV
Law x REI	-0.009***	-0.008**	-0.012*	-0.009**	-0.008*	-0.022**	-0.016***	-0.020***	-0.014
	(0.003)	(0.003)	(0.007)	(0.004)	(0.004)	(0.009)	(0.004)	(0.004)	(0.011)
GDP per Capita x REI		-0.001			-0.000			0.008**	
		(0.003)			(0.004)			(0.003)	
Rule of Law x REI		0.007**			0.008*			-0.009	
		(0.003)			(0.004)			(0.005)	
Fixed Effects									
Sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of countries	76	76	76	66	66	66	32	32	32
Observations	1,672	1,672	1,672	1,289	1,289	1,289	642	642	642
R-squared	0.451	0.452	0.451	0.367	0.367	0.364	0.593	0.595	0.593

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Table 11: Effect of Components of Collateral Laws on Sectoral Allocation of Output

The table presents the results from the following regression:

$$Share_{sc} = \alpha_s + \beta LawBook_c * REI_s + \gamma Registry_c * REI_s + \delta Enforcement_c * REI_s + \epsilon_{sc},$$

where $Share_{sc}$ is the average ratio of sectoral output or employment, to total manufacturing output or employment, respectively, of sector s in country c. The average is taken during the period 2002-2004. $LawBook_c$ is a dummy equal to 1 for countries with the sum of all law-on-book components above the median and 0 otherwise, $Registry_c$ is a dummy equal to 1 for countries that have an electronic collateral registry and 0 otherwise, $Enforcement_c$ is a dummy equal to 1 for countries that allow out-of-court enforcement 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 includes 76 countries and 22 sectors. The standard errors are clustered at the country level.

	(1)	(2)	(3)	(4)	(5)	(6)
Law on Book x REI	-0.004 (0.003)			-0.003 (0.003)	-0.004 (0.003)	-0.003 (0.003)
Registry x REI		-0.006** (0.003)		-0.006** (0.003)		-0.005 (0.003)
Enforcement x REI			-0.005** (0.003)		-0.005** (0.002)	-0.004 (0.003)
Fixed Effects						
Sector	Yes	Yes	Yes	Yes	Yes	Yes
Number of countries	76	76	76	76	76	76
Observations	1,672	1,672	1,672	1,672	1,672	1,672
R-squared	0.451	0.451	0.451	0.451	0.451	0.452

Appendix 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* (equipment, 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

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