How Collateral Laws Shape Lending and Sectoral Activity[1]

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Abstract

We investigate the effect of cross-country differences in collateral laws for movable assets on lending and the sectoral allocation of resources. We employ a unique micro-level database for a particular global bank, which includes loan amounts and the bank's estimated liquidation values of loan collateral in 12 emerging market countries. Weak collateralization laws that discourage the use of movables assets tilt lending toward the use of immovable assets. Further, loan-to-value of loans collateralized with movable assets are lower in countries with weak collateral laws, relative to immovable assets. To examine the effect of collateral laws on real activity we map the relationship of collateral laws to asset-composition and sectoral resource allocation using industry-level output data. Weak movable collateral laws create distortions in the allocation of resources that favor immovable-based production. In addition to our cross-country analysis, we perform a within-country analysis of Slovakia's collateral law reform, which confirms our findings. The results shed light on an important channel – collateral laws – through which legal institutions affect lending and real economic activity.

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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. This literature has also documented a strong set of connections causally linking increases in credit supply produced by improvements in creditors' rights to faster economic growth, greater capital investment, more rapid technological progress, higher job creation, and better opportunities for social mobility. Such results have been documented with respect to differences in outcomes across countries, across regions within countries, within countries over time, and across industries.[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. Movable assets consist of equipment, machinery, accounts receivable, and inventory. "Immovable" assets are real estate. We employ a novel cross-country 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

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[2] King and Levine (1993), Levine and Zervos (1998), La Porta et al. (1997, 1998), Taylor (1998), and Beck, Levine, and Loayza (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 industries 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, Sapienza, and Zingales (2004), Cetorelli and Strahan (2006), Dehejia and Lleras-Muney (2007), and Correa (2008) produced broadly similar results. These studies built on the theoretical and narrative insights of Goldschmidt (1933), Gurley and Shaw (1960), Gurley, Patrick and Shaw (1965), Goldsmith (1969), Shaw (1973), McKinnon (1973), and Fry (1988). There are also various articles focusing on how creditors' rights differences affect the structure of loans (size, maturity, lender concentration, the reliance on collateral), and the identity of lenders (domestic vs. foreign). See, for example, Demirguc-Kunt and Maksimovic (1998), Qian and Strahan (2007), Bae and Goyal (2009), Liberti and Mian (2010).

pledged as collateral. 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.

To examine the effect of collateral law on real economic activity, we connect differences in collateral law to differences in the composition of assets and production in the economy. Specifically, we analyze how collateral law affects the sectoral allocation of production between movables-intensive and immovables-intensive producers using industry-level output and employment data covering the universe of manufacturing firms in our sample of countries.

In theory, collateral plays five separate roles in efficient debt contracting. First, in the event of a default, secured creditors who are able to seize collateral can recover what is owed to them with lower enforcement costs than an unsecured creditor, who must await the adjudication of his claims in a bankruptcy court. Second, the use of collateral clarifies the respective claims of creditors and thereby can reduce the physical costs of a bankruptcy proceeding. Third, the possession of a security interest can improve the bargaining position of creditors when a debtor becomes financially distressed, and result in a higher probability of efficient renegotiation and greater exertion of effort by debtors contingent on distress. Fourth, at the time of debt contracting, the use of collateral can mitigate information costs because the willingness to offer collateral provides a credible positive signal about the unobservable quality of the debtor. Fifth, at the time of contracting, offering collateral can improve debtors' incentives to act in ways that are favorable to the interests of creditors.

To examine empirically the role collateral plays in debt contracting, we first investigate how the lending supply behavior of GlobalBank responds to differences in the quality of collateral protections for movable assets across 12 of the emerging market countries in which it lends. For GlobalBank we observe the collateral type and LTV at the loan-level. Thus we are able to identify within-country differences in loan supply, liquidation value, and LTV across loans collateralized with movable and immovable assets.

Those measures are reliably consistent across assets and countries because they are provided by a single lender. Employing these within-country estimates allows us to make meaningful comparisons across countries because we can use country fixed effects that absorb other country-specific factors influencing collateral choice. We examine how these within-country differences in loan supply and LTV are affected by different legal treatments of movable collateral. We measure cross-country differences in the quality of movable collateral laws in those 12 countries 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 countries, but that there is no significant difference in LTVs for loans collateralized by immovable across strong- and weak-law countries. According to our difference-in-differences estimation, in strong-law countries, LTVs of loans collateralized with movable assets are on average 21 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.

To investigate the consequences for real activity, we study how collateral law affects sectoral allocation for all firms in a country, not only the borrowers of GlobalBank. We first analyze sectoral effects for the 10 GlobalBank countries for which sectoral data exist, and then we expand the analysis to a broader sample of 76 countries. Our measures of sectoral composition are taken from UNIDO data, which provides each country's sector-specific output and employment for each of 22 sectors within manufacturing. 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. We show that weak-law countries tend to allocate greater output (and employment and number of establishments) towards immovable-intensive sectors relative to strong-law countries. Examining the within-country allocation of resources across collateral law frameworks for the 10 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 the broader sample of countries are similar but of smaller magnitude (9.9%). Combined with the findings for loan frequency and LTVs, these results show that weak collateral laws for movable assets not only limit the ability of firms to raise financing, but also skew economic activity towards activities naturally intensive in immovable assets.

We also consider a third category of GlobalBank lending in each country, which we label "Supra" collateral loans. These loans either are guaranteed and enforced outside of the borrowers' country or are collateralized by cash assets at the bank, and therefore, are effectively protected from default by the bank's right of setoff (the right to seize deposits if debt service is not paid). We find that the relatively low LTVs for loans collateralized by movables in weak-law countries relative to strong-law countries is not observed for Supra collateral loans, due to their immunity against the effects of weak collateralization laws. Interestingly, however, Supra loans in strong-law countries tend to have lower LTVs in comparison to immovables-backed loans. This likely reflects the fact – uncovered in our regression analysis – that countries with weak collateral laws for movables also suffer from a relatively lower ability to collateralize against immovable assets. For that reason, we conjecture that borrowers in weak-law countries tend to have weaker borrowing options against all non-Supra collateral, which pushes LTVs for Supra loans higher than in strong-law countries.

For most of the 12 countries in our lending sample, the legal framework relating to movables collateralization was fairly constant during our sample period. However, one of the countries – Slovakia – changed its collateralization framework for movables during our sample period. To provide further causal evidence on the relation between collateral law and debt contracting, 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 LTVs for movables, relative to immovables, rose substantially after the policy reform, reducing the LTV spread between immovable and movable assets. The magnitude of this within-country change (roughly 20 percent) is very 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. We are also able to identify sectoral shifts in production and employment (using UNIDO data) 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 create distortions in the allocation of resources that favor immovable-based production. The increase in both loan supply and LTV ratios for loans with movable assets pledged as collateral 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.

Our results reinforce previous findings regarding the importance of collateral, and collateral laws, for bank lending. According to the World Bank *Enterprise Surveys*, which are performed in over 100 countries, collateral is required for bank loans in 75% of loans worldwide.[3] 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).

Although we are the first to analyze the link between collateral laws, lending supply, and asset 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

[3] To access the surveys see http://www.enterprisesurveys.org/ (cited in Love et al., 2013).

collateralization.[4] 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. Cerqueiro et al. (2014) study the effect 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. Haselman 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 closest in spirit to Campello and Larrain (2014), who provide a detailed case study of the Romanian legal reforms that permitted movable assets to be pledged as collateral. They show that the reform broadened access to credit, particularly for firms that were making intensive use of movable capital, resulting in a sharp increase in the employment and capital stock share of movables-intensive firms. In this paper, we present evidence that corroborates their findings on access to credit using micro-level data for a much larger sample of countries. Thus we are able to uncover the mechanism through which collateral law affects debt contracting, and confirm that this mechanism is broadly applicable to collateral reform. Furthermore, we show that not only do legal impediments to collateralizing movables distort lending, they also result in substantial production distortions.

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,

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[4] 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. (2008), Amedeo (2009), 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).

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 role of collateral in lending has been particularly emphasized in the literature, and the effects of changes in the creation and enforcement of collateral rights have figured prominently in the discussion of the effects of creditors' rights. Collateral is central to debt contracting and therefore the legal institutions that define enforcement of collateral provisions in debt contracts is a key aspect of creditors' rights.

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 supra-collateral, the reform in Slovakia, and robustness checks. Section V examines the effects on the sectoral allocation of resources. Section VI 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 allocations of production.

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 included loans that are collateralized either by immovables (real estate assets) or by movables (equipment, machinery, inventory and accounts receivable). Given the structure of our regression analysis, loans collateralized by both types of collateral must be excluded from our sample. In our regressions, we compare the effects of collateralization by movable and immovables; in the case of multiple collateral 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). We are unaware of the reason why real estate-collateralized lending by GlobalBank to SMEs is absent in Brazil, Korea, South Africa and Taiwan. It is possible that lending to those four countries by GlobalBank may occur via an alternative asset-based program within GlobalBank that is not part of our dataset.

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 6,148 single-collateral loans and 2,803 multiple-collateral loans contracted with a total of 7,471 firms in our sample of 16 countries. 2,478 firms with 2,739 loans are dropped because they are located in one of the four excluded countries. For the other 12 countries, we begin with 3,925 single-collateral loans and 2,287 multiple-collateral loans, which are made to 4,993 firms. 446 of the single-collateral loans and 671 of the multiple-collateral loans in these 12 countries are excluded from our main tests because they are collateralized by Supra-collateral. Our total sample of loans collateralized either by movables or immovable for the 12 countries includes 3,479 loans (and firms), 1,014 of which are collateralized by movables and 2,465 of which are collateralized by immovables.

We measure loans as the amount of the term loan or the amount actually drawn on a line of credit. The liquidation value of the pledged asset is defined as the market value of the collateral as appraised by GlobalBank. This is the realizable value to the bank if the collateral were sold at that particular point in time. 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, an independent assessor or appraiser determines the gross 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.[5]

In addition to the loan categories already mentioned, we also include another category of loans that we label Supra collateral loans, which adds another 469 loans (and firms) to our sample, bringing the total sample to 3,972 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.

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 which GlobalBank has daily operations. 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.

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.

[5]See Degryse et al. (2014) for an analysis of the relationship between the appraised value and the minimum recovery value that the bank estimates.

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.[6] Thus, the MC Law Index ranges from 0 to 7. A score of 1 is assigned for each of 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 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.
- 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.
- Secured creditors are paid first (for example, before tax claims and employee claims) when a debtor defaults outside an insolvency procedure.
- The law allows parties to agree in a 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

[6] Our results are qualitatively 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 that make it a misleading indicator. 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 database, and in the few cases where it took the value of zero we were aware that this coding was incorrect. Indeed, because almost all of the zeroes appear to be coding errors, this field is not correlated with the other components of the score, which is further reason to doubt its veracity.

reform of 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, dramatically expanding the scope of assets that could be used as collateral. The law also gave creditors private enforcement rights, including the ability to repossess collateral and dispose of it through private auctions. 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 the 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 post-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.

Data by country on the industrial sector composition of output come 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 industrial composition of output for a larger sample of 76 countries, which include many countries other than the 10 that are in our GlobalBank database. As before, we use the UNIDO data on industrial composition, and the World Bank data to construct our MC Law Index score for the countries included in this larger sample. In our regressions analyzing the industrial composition of economic activity, we employ additional macroeconomic controls, some derived from the World Bank's *World Indicators* database (GDP per capita, the relative tariff on manufacturing and primary sectors, and population density) and one (a rule-of-law measure) from the World Bank's *Worldwide Governance Indicators*.

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. For each of the 12 countries in our sample, Figure 1 plots the frequency of immovable-backed loans against the MC Law Index. The figure shows that immovables-backed loans are more common in practically all countries, but the greater the value of the MC Law Index score, the lower the frequency of loans made against immovable assets. We then sort the 12 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, which is equal to 7%, is statistically significant, which indicates that GlobalBank lends more against immovable assets in countries that have weak laws for movable collateral.

[Insert Figure 1 here]

Next, we analyze the relationship between collateral laws and loan-to-value ratios. Figure 2 plots the differences in the average LTV between GlobalBank loans collateralized by immovable and movable assets. As the figure shows, loans collateralized by immovables tend to 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. Combined, Figures 1 and 2 are consistent with the notion that a greater legal ability to collateralize movable assets is associated with a greater supply of loans for movables-collateralized loans, relative to immovables-collateralized loans.

[Insert Figure 2 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 tend to be more similar in weak-law and strong-law countries (0.815 for weak-law countries versus 0.910 for strong-law countries), but for loans collateralized by movable assets the average LTVs for the two groups are very different (0.443 versus 0.828). 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 0.082 (=0.910-0.828) in strong-law countries and 0.372 (=0.815-0.443) 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 movable-backed loans.

[Insert Table 1 here]

In order to formally test the effect of 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.[7] $Movable_i$ is a movable indicator variable that takes the value 1 if the loan is collateralized by a movable asset and zero otherwise, and can be interpreted as collateral-type fixed effect. The specification includes a full set of country fixed effects (α_c). We cluster standard errors at the country level. The coefficient of primary interest is δ, which is identified from the within-country variation across collateral types. The coefficient provides an estimate of the difference between LTVs of loans collateralized by movable and immovable assets in strong-law countries, relative to the difference in LTVs in weak-law countries. The coefficient on *Law* is also of interest; it measures the common effect of collateral law on both movables and immovables lending. 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[8], 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.

We report the effects of the legal regime on the LTVs of different types of loans in Table 2. Column (1) reports the results without including fixed effects; column (2) adds country fixed effects; and column (3) adds sector fixed effects. The *Law*Movable* interaction term is positive, large (about 0.2), 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. Since the *Law* term varies at the country level, the country fixed effects will absorb it. According to the results of column (3), the difference between the LTV of movable and immovable-collateralized loans is 21 percentage points

[7] 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).
[8] 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.

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 0.443, the results in column 3 represent an effect in LTV of 47.6% (=0.211/0.443). These results imply large loan-supply effects are 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 movables collateral laws. Both in theory and in empirical studies of collateralized lending, the reliance on collateralized loans tends to be greatest for relatively young and small firms. It follows that the inability to employ movables 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. That is, unobservably unseasoned borrowers receiving loans collateralized by movable assets will tend to be more present in strong-law countries. For that reason, 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.[9]

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. Recall that Supra collateral insulates loan contracts from local legal

[9] In the regression results reported below, we included an internal GlobalBank firm rating to try to control for firm heterogeneity. Surprisingly, however, 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.

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 table also reports the LTVs for Supra collateral loans by country group (strong-law and weak-law). The LTVs for Supra lending are similar across the two groups of countries, although they are slightly higher on average in weak-law countries (89.7% versus 85%, 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 the use or terms for Supra collateral lending.

[Insert Table 3 here]

In order to formally compare the LTVs for Supra collateral loans to those of loans collateralized immovables, 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 $Movable_i$ is an indicator variable that takes the value 1 if the loan is collateralized by a movable asset and zero otherwise and $Supra_i$ is an indicator variable equal to 1 if the loan is collateralized by Supra collateral and zero otherwise. The coefficient δ_1 estimates the difference between LTVs of loans collateralized by movable and immovable assets in strong-law countries, relative to the difference in LTVs in weak-law countries. Similarly, the coefficient δ_2 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 21 percentage points higher than loans backed by immovables, relative to weak-law countries (given by the coefficient on the *Law*Movable* interaction term in column 3). When we compare loans backed by Supra and immovable assets, we find that the difference between the LTVs of supra and immovable-backed loans is 9 percentage points lower in strong-law countries than in weak-law countries (given by the coefficient on the *Law*Supra* interaction term). 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 immovable assets. Recall that in Table 2, column (1), we found that in weak-law countries, loans collateralized by immovables have LTVs that are roughly 10 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 discuss in Section II, a dramatic shift in the ability to collateralize movables occurred in Slovakia in 2003, and 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 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 (where, as before, we use only the first loan observed in each period). The specification includes a full set of firm fixed effects (α_i) and quarterly time fixed effects (α_t). We are interested in coefficient γ, which is identified from the within-firm variation across time. The coefficient provides an estimate of the difference between LTVs of loans collateralized by movable and immovable assets after the reform, relative to the difference in LTVs before the reform.

We include time-varying borrower-level characteristics, X_{it}, to control for differences in the supply of collateral.

Table 5 reports the estimation results for Slovakia. According to column (3), which includes borrower and quarterly fixed effects, the difference between the LTVs of movable and immovable-backed loans increases by 18.2 percentage points after the passage of the law. The average LTV for movables (immovables) in Slovakia was 0.66 (0.87) prior to the reform. Hence the results suggest that the pre-form spread in LTV across immovable and movables almost entirely disappeared post reform. The magnitude of the coefficient (0.182) in Table 8 is very similar to the comparable coefficient estimate from the cross-sectional regression (0.211) in Table 2. This is reassuring as it indicates little potential omitted variables bias in the cross-sectional regressions. The fourth column of Table 8 reports a placebo regression 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 was no general worldwide improvement in LTVs for loans collateralized by movables after January 1, 2003. The coefficient on the interaction term *Post*Movable* is statistically insignificant, which confirms that our results are not driven by a global shock increasing the difference between LTVs backed by movable and immovable assets.

[Insert Table 5 here]

C. Robustness Checks

Table 6 reports various robustness tests of our results on LTVs in Table 2. In the 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 from the 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 data from the World Bank on adherence to the rule of law in the country. We also control for differences in tariffs that are applied to manufacturing goods relative to all goods and for differences in population density. Our results are unaffected by controlling for these country-level 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. We use data from the UNIDO dataset, which provides information on output and employment for 22 manufacturing sectors.[10] 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

[10] As mentioned above, UNIDO does not provide information for Pakistan and Sri Lanka. As a result, when analyzing our GlobalBank sample of 12 countries, we are left with a sample of 10 countries.

unaffected by legal shortcomings in the ability to pledge movables as collateral.[11] This approach is akin to the Rajan and Zingales (1998) approach for measuring sectoral external financial dependence.[12] 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.[13] Figure 3 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 industries (roughly 6.5% in leather, 8.5% in machinery and equipment, 14.5% in furniture, and 16.5% in tobacco).

[Insert Figure 3 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. 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. In Figure 4, 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 index. The figure shows a strong negative relationship between the MC Law Index and the output share and employment share in sectors that are intensive users of real estate. In other words,

[11] Secured transactions over movable assets in the U.S. are governed by Article 9 of the Uniform Commercial Code (U.C.C.).
[12] 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.
[13] 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 and into machinery and equipment.

countries with weak collateral laws tend to allocate a greater fraction of their resources towards immovable-intensive sectors.

[Insert Figure 4 here]

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. As can be seen from Panel C, countries with weak collateral laws allocate on average 70.2% of their production to sectors intensive in real estate, while countries with strong collateral laws allocate only 52.1%. The difference, which is equal to 18.1 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 17.1 percentage points higher than in strong-law countries (=65.1%-48%, the difference is statistically significant at the 1%-level).

[Insert Table 8 here]

To formally test 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 one for sectors above the median of the sectoral index of real estate intensity and zero otherwise. The specification includes a full set of sectoral fixed effects (α_s). 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.) 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 variable *Share* already represents a within-country difference between resources allocated to immovable-intensive and non-intensive sectors. Therefore, 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 allocation of resources between sectors, 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.[14]

Table 9 reports the regression results. Columns (1)-(2) show the OLS results for output and columns (4)-(5) for employment. 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 manufacturing 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-level characteristics, interacted with the real-estate sectoral indicator. The magnitude of the effect is consistent with the differences reported in Table 8. 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).

[Insert Table 9 here]

It is possible that an omitted country characteristic correlated with the quality of mobvable 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

[14] 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 has been shown to affect sectoral allocation. We control for differences in tariffs that are applied to manufacturing goods relative to all goods, as these too could result in differences in sectoral allocations. We also include population density, which could affect sectoral allocation by affecting comparative advantage in production.

collateral law. 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. To address those concerns for the sectoral analysis, we construct an instrument for the interaction between *Law* and *REI*. We employ legal origin interacted with *REI* as our instrument, based on the identifying assumption that legal origin is only correlated with sectoral shares through its effect on collateral law. To measure legal origin, we rely on LaPorta et al. (1998).

In unreported results, we find that the first stage is strong. Specifically, we find that legal origins (interacted with *REI*) are ordinally ranked in terms of their positive influence on collateral law (interacted with *REI*) as follows: English (highest), German (middle), and French (lowest). 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.

<u>B. Extended-Sample of Countries</u>

Next, we extend our analysis beyond the sample of the GlobalBank countries. Because the World Bank's *Doing Business* database on movable collateral law is available beginning in 2005, we collected UNIDO data on manufacturing sectors' production and employment shares for 2005-2010. To ensure consistent and reliable measurement of cross-country differences in the quality of collateral law, we exclude countries where jumps in the MC Law Index occur during our sample period of 2005-2010.[15] We define a jump as a change of two or more units in the Index.[16] 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. Of these countries, only 66 report both output and

[15] To extend our sample backward in time – for example, 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.

[16] Our results are robust to using a threshold of one or three units for defining a major jump.

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.[17]

We report the results in Table 10. Columns (1)-(2) report the OLS results for output, columns (4)-(5) for employment, and columns (7)-(8) for the number of establishments. 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 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 (=0.9%*11). Finally, column (7) shows that weak-collateral laws also distort the allocation of resources at the extensive margin. In the aggregate, 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, which is a sizable difference (=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]

We experimented with various alternative specifications (varying the cutoffs and components of the MC Law Index included in the measures of the law indicator) but those variations did not affect the sizes of the coefficients very much; the effect is always somewhat larger for the sample of 10 countries than for the sample of 76 countries. One possibility is that this size difference reflects the non-random

[17] 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.

aspect of our GlobalBank sample. After all, GlobalBank entered these countries precisely because it viewed them as desirable locations for expanding its business. Perhaps the attributes of these countries that made them desirable locations for GlobalBank also are related to greater responsiveness of producers to economic costs or opportunities, which might explain the greater responsiveness of sectoral output shares to collateral law strength.

Finally, note that the analysis in this section focuses exclusively on the sectoral allocation within manufacturing industries. In unreported tests, we calculated the real estate intensity index for all sectors in the economy (manufacturing and non-manufacturing) and found that the variation in real estate intensity across all sectors is roughly twice as large than the variation within manufacturing. This means that we are capturing only a fraction of the total reallocation across sectors, and hence our sectoral results should represent a lower bound of the true effect of collateral laws on the sectoral allocation of resources.

C. Sectoral Allocation Shifts in Slovakia

We also examined how the change in movables collateral law in Slovakia affected the sectoral allocation in production and employment. 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 5, we plot the raw data for the proportions of production and employment allocated in sectors with either above- or below-median real estate intensity. The decrease in the share of production in real estate-intensive sectors was a bit more than 4 percentage points; the decrease in employment share was about half as large. Interestingly, in our cross-country results, differences in employment and production shares are the same. The smaller size of the shift in employment for Slovakia in the years immediately after its reform likely reflect short-term labor market rigidities.

[Insert Figure 4 here]

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 law, firms in sectors that exogenously rely more on movable factors 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 Frequency of Immovable-backed Loans

The figure plots the relationship between a country's movable collateral law index and the average fraction of GlobalBank's loans collateralized by immovable assets (real estate). The average is taken during the period 2002-2004.

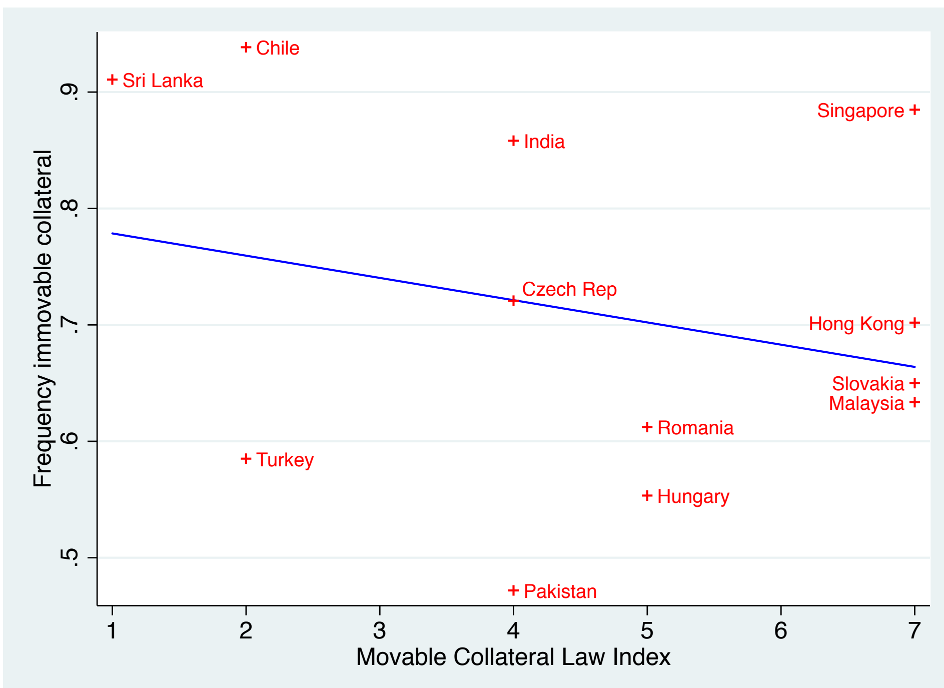


Figure 2: Collateral Law Strength and the Difference in Loan-to-Value of Immovable- and Movable-backed Loans

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.

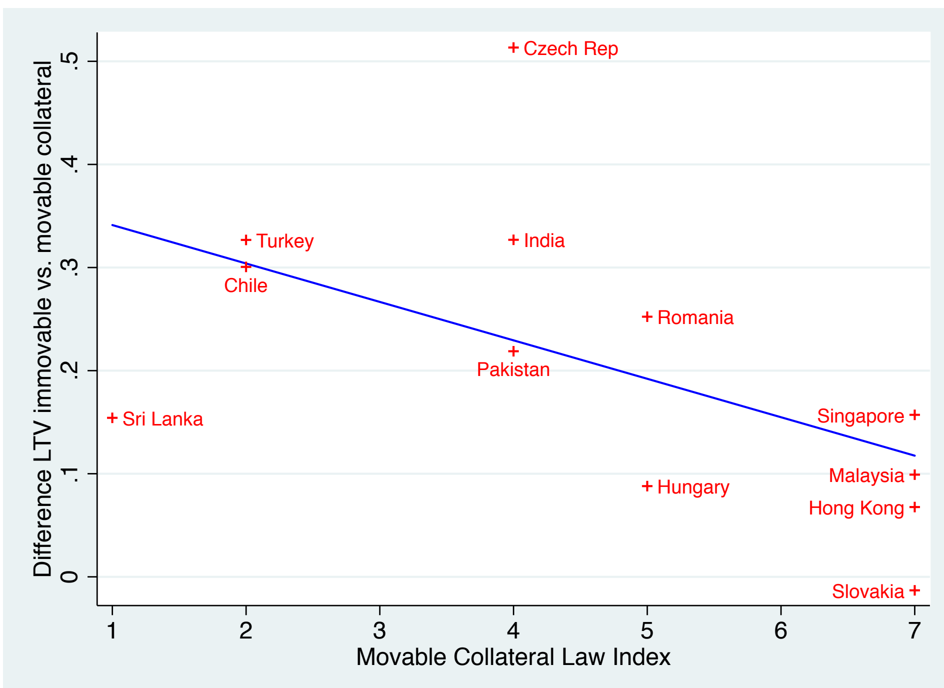


Figure 3: Sectoral Index of Real Estate Intensity

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.

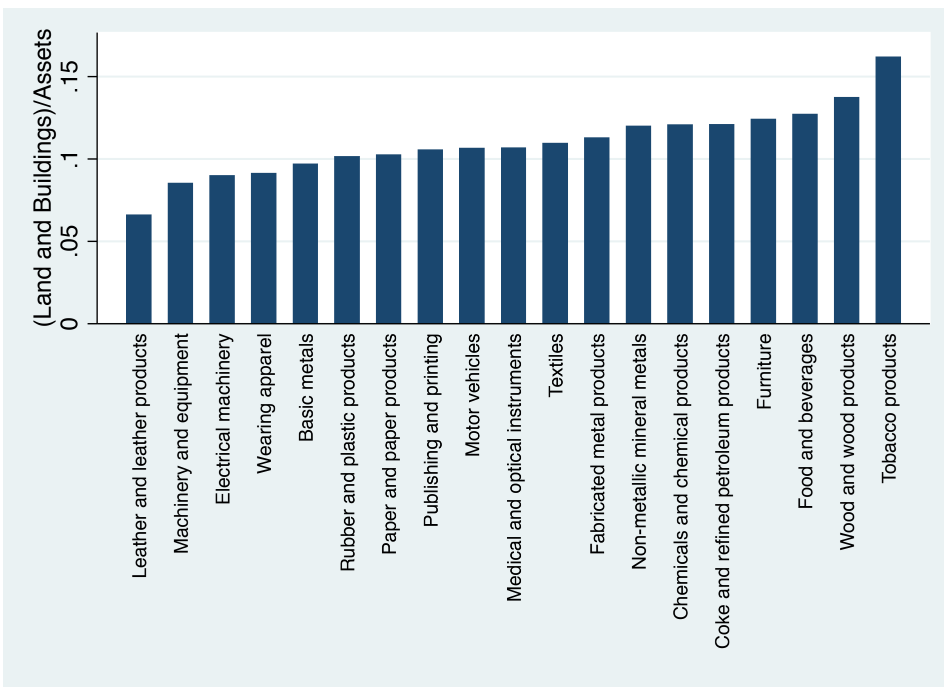
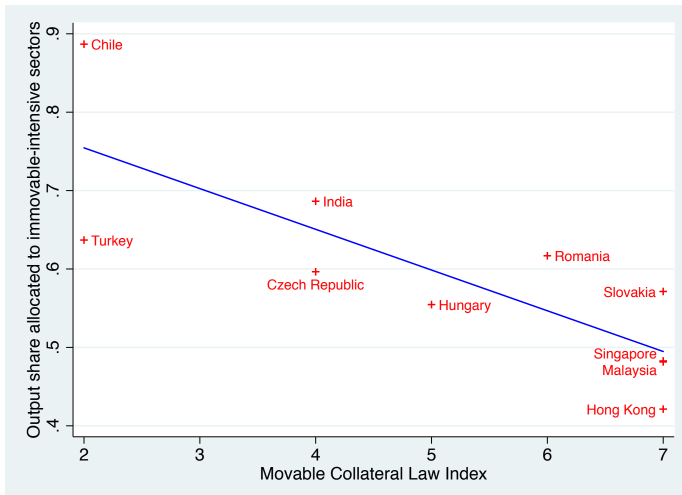
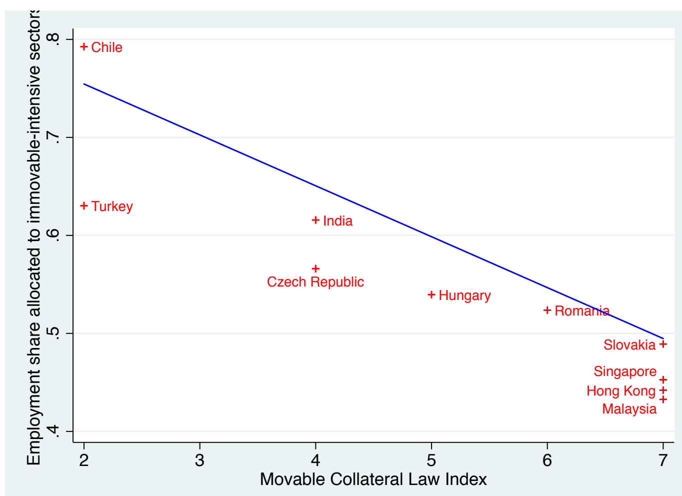


Figure 4: Collateral Law Strength and the Sectoral Allocation of Output and Employment

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.



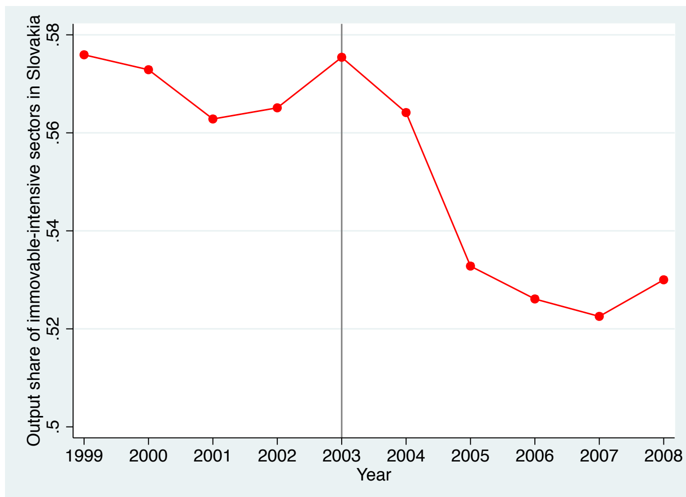
A. Sectoral Share of Output



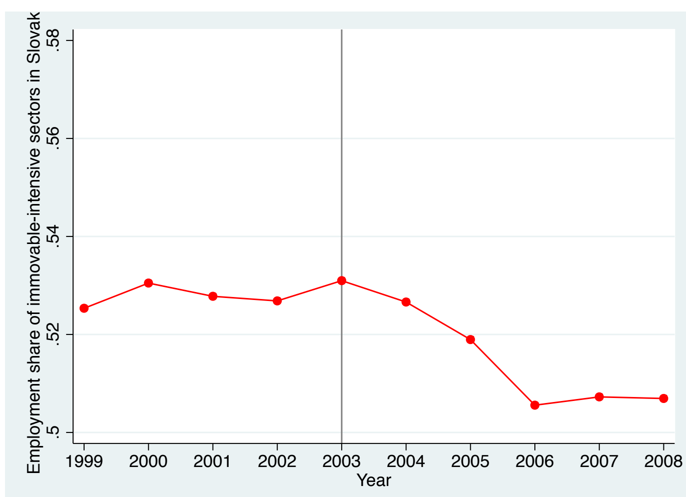
B. Sectoral Share of Employment

Figure 5: 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 3,479 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).

	(1)	(2)	(3)
Collateral =	Immovable Assets	Movable Assets	Difference Immovable - Movable Assets
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
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
Slovakia	0.844	0.857	-0.013
C. Average weak- and strong-law countries			
Weak-law countries	0.815	0.443	0.372
Strong-law countries	0.910	0.828	0.082

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 one for countries above the median of the movable collateral law index and zero otherwise. $Movable$ is a dummy variable equal to one if collateral is movable (equipment, machinery, inventory, and accounts receivable) and zero otherwise. X_i denotes a vector of firm-level controls. The sample includes 3,479 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	0.106***		
	(0.019)		
Movable	-0.292***	-0.289***	-0.288***
	(0.031)	(0.029)	(0.027)
Law x Movable	0.207***	0.210***	0.211***
	(0.033)	(0.032)	(0.030)
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	3,479	3,479	3,479
R-squared	0.25	0.27	0.29

Table 3: Immovable Frequency and 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 3,479 borrowers in 12 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
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
Slovakia	1.000
C. Average weak- and strong-law countries	
Weak-law countries	0.897
Strong-law countries	0.850

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 one for countries above the median of the movable collateral law index and zero otherwise. $Movable$ is a dummy variable equal to one if collateral is movable (equipment, machinery, inventory, and accounts receivable) and zero otherwise. $Supra$ is a dummy variable equal to one if collateral is supra (bank guarantees, financial securities, and cash held with the bank) and zero otherwise. X_i denotes a vector of firm-level controls. The sample includes 3,925 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		-0.292***	-0.290***
		(0.027)	(0.026)
Supra	0.060*	0.031	0.054***
	(0.033)	(0.020)	(0.009)
Law x Movable		0.211***	0.212***
		(0.030)	(0.029)
Law x Supra	-0.087**	-0.083***	-0.096***
	(0.036)	(0.023)	(0.017)
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	3,925	3,925	3,925
R-squared	0.16	0.25	0.27

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

This table presents the results from the following regression:

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

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 one if collateral is movable (equipment, machinery, and inventory) and zero otherwise. $Post_t$ is a dummy equal to one after January 1st 2003, the implementation date for the Slovakia reform, and zero otherwise. X_{it} denotes a vector of time varying firm-level controls. The sample in columns (1) and (2) is Slovakia only, and includes 104 borrowers for the period 2002-2004. There are 123 observations pre-reform and 184 observations post-reform. Column (3) presents results from a placebo test for all countries excluding Slovakia, and includes 3,375 borrowers in 11 countries for the period 2002-2004. 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) and (2) and the country level in column (3).

	(1)	(2)	(3)	(4)
	Sample			
Dep. Variable: LTV	Slovakia			Placebo
Post	-0.026**	-0.0003		
	(0.012)	(0.018)		
Movable	-0.203***			-0.135*
	(0.022)			(0.074)
Post x Movable	0.202***	0.184***	0.182***	0.011
	(0.031)	(0.050)	(0.050)	(0.013)
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	No	No	Yes	Yes
Observations	307	307	307	10,705
R-squared	0.34	0.67	0.67	0.78

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 one for countries above the median of the movable collateral law index and zero otherwise. $Movable$ is a dummy variable equal to one if collateral is movable (equipment, machinery, inventory, and accounts receivable) and zero otherwise. X_i denotes a vector of firm-level controls. The sample for main tests includes 3,479 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. Column (3) controls for country-level characteristics: GDP per Capita, Relative Tariff, Rule of Law, and Population Density (measured as dummy variable equal to one if the characteristic is above the median). Column (4) includes only manufacturing firms. The standard errors are clustered at the country level.

	(1)	(2)	(3)	(4)
	Robustness			
Dep. Variable: LTV	Alternative Collateral Law	Alternative Asset Classification	Controlling for Country Characteristics	Manufacturing only
Movable	-0.415***	-0.312***	-0.277***	-0.330***
	(0.032)	(0.018)	(0.049)	(0.055)
Law x Movable	0.048***	0.235***	0.203***	0.197**
	(0.004)	(0.022)	(0.048)	(0.081)
GDP per Capita x Movable			0.027	
			(0.074)	
Relative Tariff x Movable			0.015	
			(0.044)	
Rule of Law x Movable			0.026	
			(0.098)	
Population Density x Movable			-0.053	
			(0.053)	
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	3,479	3,404	3,479	1,186
R-squared	0.27	0.28	0.28	0.33

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

This table presents the results examining alternate cutoffs for the collateral law index for regressions estimating loan-to-value (Table 2). Collateral law strength is measured into three groups, where *Low* denotes a movable collateral law index of less than 5, *Middle* denotes a movable collateral law index of 5 or 6, and *High* 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 one if collateral is movable (equipment, machinery, inventory, and accounts receivable) and zero otherwise. The sample includes 3,479 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	-0.288***	-0.262***
	(0.027)	(0.035)
Middle Law x Movable	0.178**	
	(0.069)	
High Law x Movable	0.214***	0.187***
	(0.029)	(0.036)
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	3,479	3,479
R-squared	0.29	0.28

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	-	-
Turkey	0.637	0.630
Sri Lanka	-	-
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
Slovakia	0.571	0.489
C. Average weak- and strong-law countries		
Weak-law countries	0.702	0.651
Strong-law countries	0.521	0.480
Difference	0.181	0.171

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 one for countries with movable collateral law index above six and zero otherwise. REI_s is a dummy equal to one for sectors above the median of the sectoral index of real estate intensity and zero otherwise. X_c is a vector of country-level controls. 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.

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Variable:	Output Share			Employment Share		
	OLS	OLS	IV	OLS	OLS	IV
Law x REI	-0.014**	-0.015***	-0.021**	-0.013**	-0.017***	-0.019
	(0.005)	(0.003)	(0.008)	(0.005)	(0.004)	(0.011)
GDP per Capita x REI		-0.005			-0.010	
		(0.005)			(0.006)	
Relative Tariff x REI		0.018***			0.023**	
		(0.005)			(0.007)	
Rule of Law x REI		-0.012***			-0.009**	
		(0.003)			(0.004)	
Population Density x REI		-0.013***			-0.014**	
		(0.003)			(0.005)	
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	0.373	0.381	0.372	0.355	0.369	0.353

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 one for countries with movable collateral law index above six and zero otherwise. REI_s is a dummy equal to one for sectors above the median of the sectoral index of real estate intensity and zero otherwise. X_c is a vector of country-level controls. 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.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dep. Variable:	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)	
Relative Tariff x REI		0.012**			0.011			0.258***	
		(0.006)			(0.009)			(0.024)	
Rule of Law x REI		0.002			0.004			-0.009	
		(0.004)			(0.005)			(0.005)	
Population Density x REI		-0.006			-0.006				
		(0.005)			(0.010)				
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