Enlarging the Contracting Space: Collateral Menus, Access to Credit, and Economic Activity*

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This Draft: November 3, 2014

Abstract

Recent reforms across Eastern European countries gave more flexibility and information for parties to engage in secured debt transactions, reducing court involvement. The menu of assets legally accepted as collateral was enlarged to include movable assets (e.g., machinery and equipment). Generalized difference-in-differences tests show that firms operating more movable assets borrowed more, invested more, hired more, and became more efficient and profitable following those changes in the contracting environment. The reforms also democratized access to credit, with more firms abandoning their prior zero-leverage status. This financial deepening triggered important reallocation effects: Firms affected by the reform increased their share of capital stock and employment in the economy.

JEL Classification Numbers: G32, K22, O16.
Keywords: Contractibility, collateral, capital structure, credit availability, economic activity.

*We thank Kevin Aretz, Patrick Bolton, Charles Calomiris, Geraldo Cerqueiro (discussant), Bruno Ferman, Erasmo Giambona, Andrew Hertzberg, Andres Liberman, Maria-Teresa Marchica, Rafael Matta, Gabriel Natividad, Tomek Piskorski, Katharina Pistor, Jacopo Ponticelli, Wenlan Qian (discussant), Jose Scheinkman, Philipp Schnabl, and Daniel Wolfenzon for their useful discussions and suggestions. We also appreciate comments from seminar participants at Chinese University of Hong Kong, Columbia Business School, Columbia–NYU Junior Corporate Finance Meeting, FGV–São Paulo, Symposium on Emerging Financial Markets (Beijing), University of Queensland, University of New South Wales, European Finance Association (Lugano), World Bank, and Michigan State University. Felipe Silva and Pablo Slutzky provided excellent research assistance. We thank Peter Murrell for kindly sharing his data on court efficiency in Romania. The usual disclaimer applies.

1 Introduction

The access to credit in imperfect capital markets is a function of the menu of assets that can be offered as collateral by borrowers, verified by courts, and liquidated by creditors (Hart and Moore, 1994). To facilitate contracting in these markets, policy has favored initiatives that enhance the bargaining power of creditors and deepen the involvement of courts in resolving disputes. These policies have focused on the allocation of control rights over assets in liquidation, with mixed results. In contrast to early work highlighting the positive aspects of strengthening creditor rights (e.g., La Porta et al., 1997), recent studies show that reforms boosting creditors' powers often lead to less — not more — credit taking (Lilienfeld-Toal et al., 2012; and Vig, 2013). At the same time, policies that rely on court involvement become tied to the quality of court systems. On that front, evidence shows that court inefficiency has hampered the success of reforms meant to ease credit access (Chemin, 2010; and Ponticelli, 2013). These results make it important to reconsider how the contracting environment affects credit access and economic outcomes.

To enable contracts secured by collateral, an effective legal framework must integrate a number of constructs. First, it must identify assets over which agents can establish security interests; that is, the types of assets that can be offered as collateral (a legal construct called "creation"). The framework must also ensure that creditors can discover information on all claims against assets pledged as collateral ("perfection"). Finally, it must ensure that creditors can seize assets that were pledged when borrowers default ("enforcement"). In recent years, a number of countries have experimented with sharp changes in parameters governing secured transactions, some of which are not centered around the idea of strengthening creditors' rights or judicial enforcement. In this paper, we study the case of Romania as a basis to understand how enlarging the contracting space (larger "collateral menus") and enhancing the information available to parties to secured transactions determines the availability of credit to firms, ultimately affecting other aspects of economic activity. We then generalize our findings across countries in the same region; some of which witnessed similar regulatory changes, but at different points in time.

Throughout the 1990s, Romania's Commercial Code only allowed for secured transactions involving immovable assets (land and buildings). For practical purposes, movable assets (machinery and equipment) could not be pledged as collateral — those assets were dubbed "dead capital." Regarding creation, movable pledges were considered *possessory* and required the physical transfer of possession of the original collateral asset in (its entirety) to the pledgee. Regarding perfection, there was no uniform system for the registration of creditor seniority over pledged assets. Finally,

enforcement of secured agreements had to be implemented through the court system, bound to be a long, wasteful process. Around the world, companies' movable assets comprise about half of their total tangible assets; yet in Romania, as well as in other Eastern European countries, those assets could not be pledged. In the year 2000, the Romanian government implemented Law 99, which transformed the framework in which secured debt contracts were written. By abolishing the possessory nature of movable assets, Law 99 expanded the range of assets that could serve as collateral, making it possible for firms to give creditors "substitute assets" (e.g., cash equivalents) if mutually agreed. It also introduced a uniform electronic system of real-time information on seniority of interests over movable assets. Finally, the new law allowed for creditors to repossess and sell secured assets of borrowers in default without court involvement.

The Romanian setting is unique in identifying the *types* of assets that could allow for credit expansion under a collateral reform. As the law made it possible to pledge *movable* assets as collateral for the first time, it would affect firms that make intensive use of machinery and equipment. *Immovable* assets, on the other hand, were customarily used as collateral before 2000, and the reform had no bearing on contracts secured by immovable assets. This institutional feature helps us identify the link between collateral menus and credit. To estimate the effects of the reform, we take advantage of the fact that some sectors of the economy naturally demand more machinery and equipment than others. We rank sectors in Romania according to movable assets intensity, which stems from the nature of firms' production processes. We then conduct a difference-in-differences test in which we contrast firms operating in sectors with high versus low demand for movable assets, before and after the passage of the law. To minimize potential confounders (e.g., concurrent credit supply shocks) we benchmark the results from this test against a test that measures pre–post reform changes along the high versus low use of immovable assets; assets that serve as collateral, but were not part of the reform.

Our base tests show that firms operating in industries with more overall tangible assets (the total sum of land, buildings, machinery and equipment) observe an increase in their leverage ratios after the reform. As we break these effects across movable and immovable assets, however, we find that only those firms operating in high *movable* assets industries observe an enhancement of their ability to borrow after the reform. We look not only at the amount of debt firms raise (intensive margin), but also at the likelihood firms start using debt in the first place (extensive margin). On this front, our results point to an expansion and "democratization of access to credit": firms operating more movable assets — particularly smaller firms — observe an increase in their propensity

to contract debt for the first time, abandoning their "zero-leverage" status.[1] Those same firms also accumulate less cash in their balance sheets. Whether firms operate more or less immovable assets, in contrast, does not have any effect in their use of debt financing following the reform (either on the intensive or extensive margins).

The increase in credit access that stems from operating more movable assets is economically sizable. Controlling for key capital structure determinants such as firm size, age, profitability, and even overall asset tangibility, a firm operating in the top quartile of the movable assets distribution observes an increase in its leverage ratio by 2.4 percentage points more than its counterpart in the low movables ranking following the reform. This is a significant number when one considers that the average debt-to-asset ratio of Romanian firms is just 10.5%; that is, a 23% increase relative to the baseline. Using the same comparison, the proportion of zero-leverage firms drops by 16 percentage points more in the high movable assets category (or 28% of the sample mean) after the reform.

Prior research shows that the efficiency of local courts can ultimately determine the success of credit reforms. In our setting, this prior is interesting in helping us understand what happens to reforms that make courts *less* central to contracting. It also helps us better identify our results, by breaking up effects along small geographical regions for which we expect heterogeneous outcomes. Romania has 41 court jurisdictions and we are able to gather data on court efficiency for each of these jurisdictions the year before the reform. As it turns out, our results on the link between collateral reform and credit expansion are directly affected by the efficiency of local courts. To use a concrete example, we find that the proportion of firms raising debt for the first time after 2000 is almost 30% higher in jurisdictions where the backlog of pending commercial cases per judge is above the national median (inefficient court jurisdictions). Our findings imply that the Romanian reform reduced legal constraints to credit expansion by making courts less important to contracting.

Our analysis goes further in showing how changing the ability of firms and lenders to sign secured debt transactions may have far-reaching implications for corporate outcomes. We find that firms with more movable assets not only access more credit after the reform, but also invest in more tangible assets, which allow for more debt capacity. To gauge the effect of this spur in capital investment, we consider a number of additional outcomes. First, we examine if firms change their investment in labor and find that together with the increase in capital investment firms also hire more. We look at measures of profitability and find that they also increase for firms with more movable assets following the reform. Finally, we examine if the increase in tangible assets and

[1] Recent work by Assunção et al. (2013) consider the democratization of credit for auto loans in Brazil.

labor usage leads to changes in productivity. We find that firms with more movable assets observe an increase in total factor productivity after the reform. Our findings imply not only that firms raise more funds and grow more as a result of their enhanced debt capacity, but also seem to establish a better asset mix. Looking at the aggregate consequences of the reform, we document important reallocation effects across the economy. Sectors that make heavier use of movable assets witness a stark increase in their share of the fixed capital stock in the Romanian economy: from 37% to 52% between 1999 and 2005. These same sectors witness a significant increase of their share of employment in the economy: from 31% to 38%.

We gauge the external validity of our inferences by extrapolating our tests to other Eastern European countries. During our sample window, two other countries in the region enacted collateral laws that resemble the reform passed by Romania (Latvia and Poland). At the same time, three other countries failed to pass any such laws (Czech Republic, Ukraine, and Russia). Concomitantly, by the year 2000, other countries in the region had already long passed laws similar to Romania's law (Bulgaria, Estonia, Hungary, and Lithuania). While these economies are similar in important dimensions, the passage of collateral reforms was not contemporaneous, owing to various idiosyncrasies affecting the speed of reforms.[2] This time variation in the wave of reforms allows us to exploit both within-country and cross-country contrasts. Similarly to our estimation for Romania, we find that secured transactions reforms increased leverage ratios of firms intensive in movable assets by 3.7 percentage points relative to firms with less movable assets in other transition economies. Similar patterns also emerge when we look at outcomes such as savings, investment, employment, productivity, and profitability.

We subject our results to a long battery of checks. Among others, we falsify our experiment by testing for the introduction of "pretend reforms" in the year 2000 in the countries that share borders with Romania (Bulgaria, Hungary, and Ukraine) as well as its largest trade partner (Italy). None of these countries passed such reforms in or about 2000, yet one could worry that underlying economic, geopolitical, or technological factors may have allowed firms in some industries (those with high movable assets) to gain more access to debt starting in 2000. We, however, find no significant increase in the credit capacity of firms with movable assets in these placebo countries. Our analysis considers several industry dynamics (e.g., sensitivity to business cycles) and utilizes alternative econometric methods (matching estimations) to ensure the robustness of our results

[2]Ample literature argues that those reforms were prompted by external pressures from the European Union (EU) and the European Bank for Reconstruction and Development (EBRD). See Haselmann et al. (2009) for a study on the impact of these reforms on banking activities.

and consistency of our inferences.

Only a small literature has analyzed the impact of sudden changes in the contracting environment using detailed, country-specific firm data as we do in this paper. Lilienfeld-Toal et al. (2012) and Vig (2013) look at reforms in India that empowered creditors in seizing assets of defaulting firms. They find that strengthening enforceability can lead to a decline in borrowing, especially for smaller firms. These papers are part of a stream of research arguing that enhancing creditors' rights can make it harder for firms to access credit. Our results also speak to an emergent literature on court efficiency and economic outcomes (e.g., Chemin, 2010; and Ponticelli, 2013).

Our paper adds to the literature that studies the impact of collateral on leverage ratios. Among recent studies, the emphasis has been on variations in the value (Gan, 2007), quantity supply (Campello and Giambona, 2013), or salability (Benmelech, 2009) of assets that are used as collateral. Our study is different as it identifies the impact of the enlargement of the contracting space — what is accepted as collateral — on access to debt financing. In this way, our results are important for economic policy-makers, who cannot alter asset liquidation values or their supply in secondary markets, but can alter collateral menus as a way to enhance financial contractibility. Our paper also stands out in that real-side outcomes such as productivity, labor, or profitability are only rarely examined in conjunction with the impact of collateral on access to credit.[3]

Lastly, our paper is connected to the financial development literature. Previous studies link creditors' rights and financial development by documenting a positive cross-country relation between credit protection and the size of credit markets (La Porta et al., 1997, 1998; and Levine, 1998, 1999). These analyses are often conducted with country level data and do not show which characteristics of financial contracting matter most. By emphasizing a detailed, micro-level analysis of the impact of collateral law reforms that affect different types of assets, we are able to describe a tight link between the development of financial institutions — in particular, laws governing specific contracting terms — and economic outcomes.

2 Institutional Setting: Romania's Secured Transactions Reform

An effective legal framework for secured transactions must contemplate and integrate three critical features. First, "creation": ensuring that the law permits to establish a security interest over an asset for a certain transaction. Second, "perfection": ensuring that creditors can promptly

[3]One exception is Benmelech and Bergman (2011), who look at the impact of increases of creditors' rights on technological innovation and productivity in the airline industry across countries. Chaney et al. (2012) consider the impact of land prices on the connection between collateral and investment.

discover existing claimants (and their seniority) against an asset pledged as collateral. Third, "enforcement": ensuring that a creditor can quickly seize and dispose of the asset pledged as collateral in the event of default. Romania provides for a textbook case analysis of a country enacting regulatory changes that significantly enhance the law of secured transactions. In this section, we provide the institutional context for Romania's collateral reform.

Throughout the 1990s, two major — often contradictory — codes governed secured transactions in Romania: the Civil Code and the Commercial Code.[4] A creditor in Romania could secure a loan by creating a security interest over immovable assets (mortgage) and over movable assets (pledges). The legal framework for movable assets, however, was remarkably cumbersome. Regarding creation, pledges required the physical transfer of possession of the collateral to the lender. Pledges took the form of *possessory* interests, with each asset specifically identified in the contract (e.g., each individual inventory item, piece of equipment, or receivable stub). This meant that pledges were non-substitutable; that is, the creditor could not be given similar assets of equal value. Such system made it costly and risky for creditors to monitor any movable collateral offered by firms. With respect to perfection, there was no consistent system of registration of security interests or any other practical way of determining their existence and the establishment of their priorities. The system was plagued by fraud as multiple ownership records of an asset often appeared (and even disappeared) across different registries (e.g., municipal jurisdictions). Finally, the enforcement of security agreements had to be implemented through the court system, which would often take several years. The slow pace of enforcement often led to large losses of collateral value of movable assets in liquidation due to technological obsolescence, natural depreciation, and outright theft.

During the same period, the European Bank of Reconstruction and Development (EBRD) had been pushing for secured transactions reforms in Eastern Europe. In January 1999, the Center for the Economic Analysis of Law (CEAL), with the support of local attorneys and the World Bank, drafted a proposal on the regulation of security interests in movable property. Shortly after, in May 1999, the Romanian parliament passed Law 99, whose Title VI contained the "Legal Treatment of Security Interests in Personal Property." The new law was molded after Article 9 of the American Uniform Commercial Code, seen as the state-of-the-art legislation on secured transactions over movable assets. Law 99 came into full force in December 2000.

Romania's 2000 reform vastly expanded the range of assets that could serve as collateral. It

[4]Romania's Common Law system resembles the French Civil Code. See de la Peña and Fleisig (2004) for a detailed description of the evolution of Romania's legal framework for secured transactions prior to 2000. Murrell (2001) describes the country's commercial court system.

introduced a broad system of security interests and derogated the old pledge regime. Importantly, the law allowed parties to establish security interests over movable assets without transferring possession of the asset to the creditor. The law also introduced the "Electronic Archive of Security Interests in Personal Property," a fully-automated system of perfection for security interests over movable assets that instantaneously files into a database notices that a security interest has been taken over a movable asset.[5] Finally, the law awarded creditors legal powers to repossess pledged collateral without court intervention. In particular, it authorized creditors to use self-help to repossess collateral as long as a breach of the peace did not occur.

Figure 1 plots the evolution of the number of filings into the Electronic Archive from 1996 through 2005 (left vertical axis). The archive's entries have grown exponentially since its inception in 2000. The movable assets archive system received 65,000 filings in 2001, rising to 360,000 filings in 2005. As of 2005, cumulative gross filings amounted to roughly one million. The notice of the security interest does not require filing the amount of the obligation secured, hence the amount of secured credit cannot be determined from the number of filings. Nonetheless, several other indicators are consistent with a rapid and large increase in the volume of credit granted to companies after the 2000 reform. For example, the number of borrowers reported in the Central Bank's debtor registry rose from 18,000 in 2000 to more than 100,000 in 2005 (Chaves et al., 2004). Along these lines, Figure 1 displays the evolution of the total volume of corporate bank credit as a share of GDP from 1996 to 2005 (right vertical axis). The fraction of corporate credit to GDP almost tripled between 2000 and 2005, rising from 7% to 20%.

3 Data and Empirical Strategy

3.1 Data

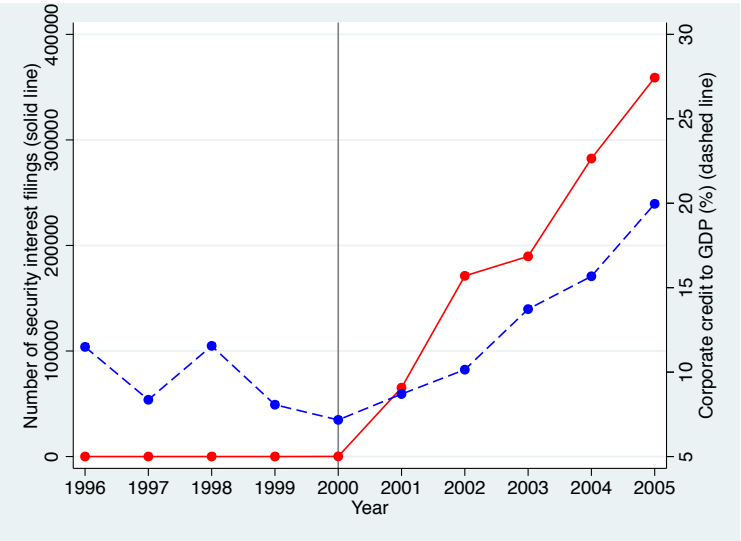
We use firm-level information from Amadeus, a commercial dataset compiled by Bureau van Dijk. Amadeus contains financial statements from millions of companies operating in 35 European countries. In Romania, Bureau van Dijk collects financial statements from the Chamber of Commerce and Industry. All joint stock companies, partnerships, and limited liability companies are required to file their financial statements to the Romanian National Trade Register Office. As a result, the data coverage of Amadeus for Romania is comprehensive, covering the majority of privately-held companies in the country.[6] The Amadeus dataset is released every year and each version includes

[5] Romania's system was the world's most advanced at its inception, being the first to accept fillings over the internet. Love et al. (2004) study the effects of the introduction of collateral registries across a large number of countries.

[6] Filing requirements for other Eastern European countries are less strict.

Figure 1: Evolution of Security Interest Filings and Corporate Credit to GDP

The figure plots the evolution of the number of security interest filings in the Electronic Archive of Security Interests in Personal Property (red solid line) and the ratio between corporate credit and GDP in Romania (blue dashed line). The gray vertical line denotes the year of the collateral reform.



up to ten years of information per firm. If a firm stops filing, it remains in the dataset for four subsequent years and it is then dropped. This creates a survivorship bias, which we overcome by appending various versions of Amadeus over the period of our study.

Our basic outcome variable is leverage, which should be affected by changes in the menu of assets firms are able to offer as collateral. We also glean additional insights into firms' borrowings by looking at their savings behavior; in particular, their need to carry cash balances. We measure *Leverage* as the ratio between total debt and the book value of assets. *Cash* is the ratio of cash holdings and cash equivalents to total assets. Our base analysis controls for the standard determinants of capital structure that are available in the data (e.g., Rajan and Zingales, 1995 and Lemmon et al., 2008). We measure *Size* as the log of total assets; *Age* is the number of years the firm is in operation; *Profitability* is the ratio of earnings before interest and taxes to total assets; and *OverallTangibility* is the ratio of fixed assets (property, plant and equipment) to total assets. The Amadeus data does not provide information on the composition of fixed assets into movable and immovable assets.

We also study the effect of the reform on a set of real-side corporate outcomes. *Investment* is the change in fixed assets between two consecutive years plus depreciation scaled by lagged fixed assets; *Employment* is the number of employees; total factor productivity (*Productivity*) is

the residual from a Cobb-Douglas production function;[7] *Sales* is the log of sales. Following the literature on asset tangibility and leverage, we focus on manufacturing firms (e.g., Campello and Giambona, 2013). We winsorize variables at the upper and lower 1% to avoid the impact of extreme outliers. The final dataset contains 28,046 companies over the 1996–2005 period.

Table 1 reports the descriptive statistics of our data. The mean value of *Leverage* of all firms is 10.5%.[8] Interestingly, the 50^{th} percentile value of *Leverage* is zero, indicating that there is sizable fraction of "zero-leverage firms" in the economy. We define *ZeroLeverage* as a dummy variable equal to one if a firm has no leverage and zero otherwise. According to the table, on average 57% of the firms in the sample are financed entirely with equity. On average, fixed assets account for 38% of total assets, a figure that resembles that of US companies. Firms hold on average 8% of their assets in cash, also in line with US counterparts at the time. The sample average firm in the sample is young and small, consistent with private sector enterprises in transition economies; it is seven years old; has total assets worth $1.8 million (in 2000 US dollars); and hires 65 employees.

TABLE 1 ABOUT HERE

3.2 Test Strategy

Since the Romanian reform introduced provisions allowing firms to pledge movable assets as collateral, it should benefit particularly firms operating in sectors that make intensive use of assets such as machinery and equipment. To identify the effect of the reform, we take advantage of the fact that some sectors are inherently more intensive in machinery and equipment than others.

We exploit ex-ante variation in asset-type demand that stems from the nature of firms' production processes and conduct a difference-in-differences test around the passage of the law. To do so, we rank manufacturers in Romania according to a movable assets demand index (explained shortly). We then assign to a "treatment group" those firms operating in industries at the high-end of the sectoral ranking. The "control group" consists of firms in the bottom of the ranking. Next, we calculate the pre- versus post-reform difference in the outcome variable of interest (e.g., *Leverage*) for the treated group, doing the same for the control group. Finally, we calculate the difference between these two group differences. Our estimation accounts for both individual firm- and year-fixed effects. As we discuss below, we provide a number of checks on the validity of our strategy.

[7] We define *TFP* for firm i in year t as $\log(TFP)_{it} = \log(y)_{it} - \alpha \log(k)_{it} - (1-\alpha)\log(l)_{it}$, where y denotes sales, k fixed assets, and l number of employees. We allow factor elasticities to vary across sectors. We measure the labor elasticity for each sector as the average labor share of value added. See Larrain and Stumpner (2014) for details.

[8] This figure is similar to that found in prior work on Romanian firms (Nivorozhkin, 2005).

3.3 Sectoral Movable Assets Index

In a legal framework where movable assets are considered "dead capital," the use of movable assets in firms' production processes is likely to be a distorted representation of the underlying demand for those assets. In particular, it is likely that movable assets are under-utilized. As such, even if Amadeus provided data on the *observed use* of movable assets before 2000, we could not use that information to make predictions about the impact of the collateral reform. Instead, we need to gauge firms' *desired use* of movable assets. To do so, we must identify comparable manufacturing firms whose use of movable assets are unconstrained by the severe legal frictions observed in Romania before the reform.

3.3.1 Index Construction

To construct a measure gauging the extent to which firms operate movable assets in the absence of financing constraints, we look at data from the United States. We do so assuming that firms in the US more closely utilize a *desired* mix of assets in their production processes. We take that such asset mix is driven by industry-specific characteristics and that different industries may make more or less intensive use of movable assets for technological reasons.

The asset mix characteristic that matters the most for our analysis has to do with "asset hardness." On that dimension, a regular firm operates both fixed assets and other (liquid) assets. To ease exposition, we can divide a firm's assets accordingly as follows:

$$Total\ Assets = Fixed\ Assets + Other\ Assets \tag{1}$$

The first category encompasses assets such as machinery, equipment, land, and buildings. The second contemplates assets such as cash, accounts receivables, and inventory. Notably, the 2000 reform allowed firms to pledge movable fixed assets such as machinery and equipment. The reform, however, did not alter the pledgeability of immovable fixed assets such as land and buildings, which were already pledgeable. The unique manner in which the reform affects some types of fixed assets suggests the following decomposition:

$$Total\ Assets = Movable\ Assets + Immovable\ Assets + Other\ Assets \tag{2}$$

With this differentiation in mind, we construct the movable assets index using data on US manufacturers as follows. First, we follow Campello and Giambona (2013) in identifying information on the decomposition of firms' fixed assets between: (1) machinery and equipment and (2) land and

buildings. This information is conveniently available for the 1984–1996 period in the Compustat database; that is, it contains data on manufacturers' asset-mix for the period prior to the collateral reform. For each individual firm, we compute the time-average ratio of machinery and equipment to total assets. Next, we follow the guidelines of the International Standard Industrial Classification (ISIC) and divide the sample into 48 three-digit sectors. For each sector, we calculate the movable assets index as the median of the movables-to-total asset ratio of the firms operating in that sector. We do the same calculation for the land and buildings-to-total assets ratio, thus computing the immovable assets index. Likewise, we use the fixed assets-to-total assets ratio to compute the overall tangibility index."

The examination of the indices provides some interesting insights. Overall tangibility equals 34% of total assets, on average. Movable assets, in turn, constitute 54% of the ratio between fixed assets and total assets. The correlation between the movable assets index and the overall tangibility index is fairly high (equal to 0.55). More interestingly, we find that the correlation between the movable and immovable assets indices is positive, but low (only 0.30). This would point to some degree of complementarity (as opposed to substitution) between movable and immovable assets.

Figure 2 plots the movable assets index for the 48 industries examined. The figure reveals a substantial degree of cross-sectoral variation in the usage of movable assets. Manufacturing of precious metals, domestic appliances, and furniture are examples of industries with low intensity in movable assets. In these industries, machinery and equipment amounts to about only 10% of total assets. In contrast, the manufacturing of metals, glass, and paper constitute examples of industries with high usage of movable assets. In these sectors, machinery and equipment amounts to well over 30% of total assets.

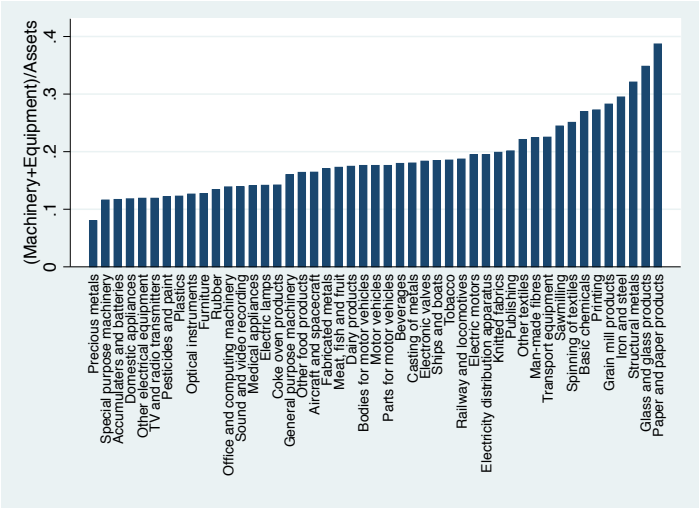
3.3.2 Operating Assumption

Our approach does not require that the value of the index in each sector is exactly the same in the US and in Romania. The approach only assumes that the sectoral *ranking* of demand for movable assets is similar across these countries.[9] For example, the manufacture of paper products demands intense use of large mills (heavy machinery and equipment), regardless of whether the factory is operated in the US or Romania. On the other hand, the manufacture of precious metal is relatively less dependent on machinery, with most assets composed of land and mining rights, again independent of the country in which firms operate. As we restrict our attention

[9]The approach is similar to that of Rajan and Zingales (1998), who build an international index for firms' need of external financing.

Figure 2: Sectoral Index of Movable Assets Intensity

The figure plots the sectoral index of movable assets intensity for the 48 three-digit manufacturing sectors in the sample (ISIC, Revision 3). The movable assets index is calculated as the median of the time-average ratio of machinery and equipment to total assets across publicly traded firms in the US in each sector during the period 1984-1996. The figure is sorted in ascending order with respect to movable assets intensity.



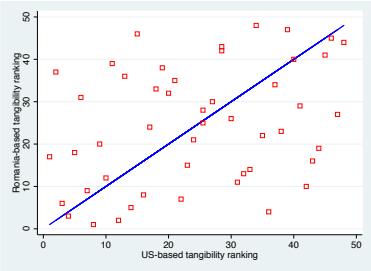
to traditional manufacturing activities in countries with sizable industrial sectors, our working hypothesis appears to be plausible. In particular, manufacturing firms have more homogenous production process around the world and many Romanian manufacturers present a fairly high level of competitiveness, with a presence in international markets for a number of goods.

Since we have data on overall tangibility for Romanian firms (that is, movable plus immovable assets), we can compare sectoral indices based on total asset tangibility across US and Romanian manufacturers as a way to assess the plausibility of our strategy. Indeed, we can make that comparison with any other country that serves a reasonable benchmark for credit-unconstrained financing. Our prior is that the observed asset mix of Romanian firms before the 2000 reform was distorted away from an optimal benchmark due to legal constraints. The collateral reform, in turn, should make Romanian firms more able to utilize an optimal asset mix.

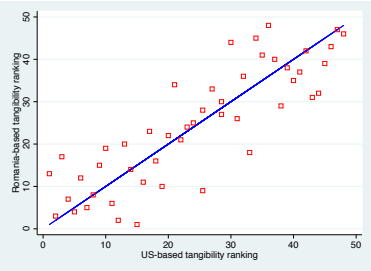
In Panels A and B of Figure 3, we plot the ranking of the overall tangibility index based on US data (our primary benchmark) against the ranking based on Romania data, with a 45 degree line drawn for ease of reference. The figure reports a similar contrast for the case of Germany (an auxiliary benchmark) in Panels C and D. The correlation of the overall tangibility index between the US and Romania in the pre-reform period is only 0.32. Accordingly, Panel A depicts a very

Figure 3: Comparison of Sectoral Indices of Overall Tangibility based on Romania, United States, and Germany Data

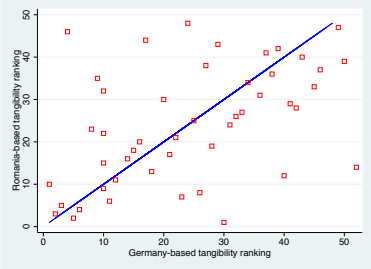
Panel A reports the scatter plot between the sectoral ranking of the Romania-based and the US-based index of overall tangibility, over the pre-reform period (1996-2000). The plot includes a 45 degree line for ease of reference. Panel B reports the scatter plot between the ranking of the Romania-based and the US-based index of overall tangibility, over the post-reform period (2001-2005). Panels C and D report the scatter plots for the rankings of the Romania-based and the Germany-based overall tangibility indices, over the pre and post-reform period, respectively.



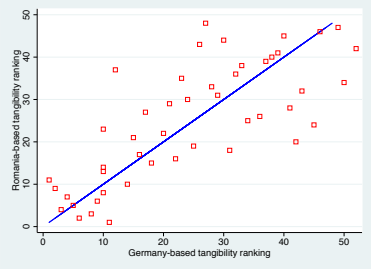
A. Romania vs US: before reform



B. Romania vs US: after reform



C. Romania vs Germany: before reform



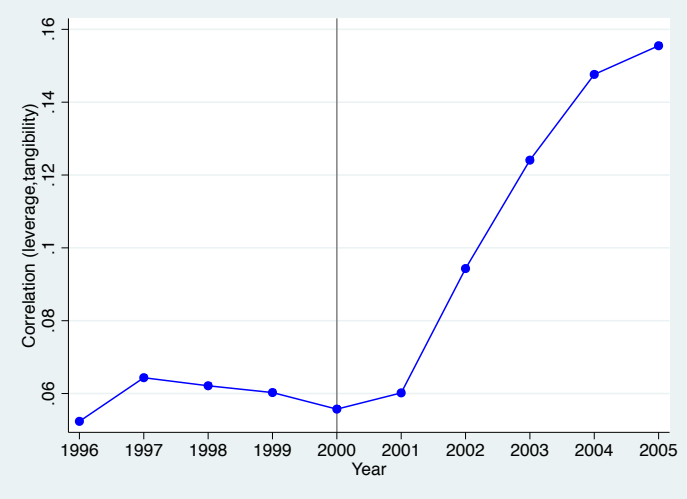
D. Romania vs Germany: after reform

noisy association between the use of fixed assets in similar industries across those two countries. Panel B, in contrast, suggests that the correlation in the post-reform period is much higher. Indeed, the correlation grows nearly three times to 0.83, becoming highly statistically significant (1% level). To focus on a specific example, consider the printing industry. This industry is ranked #43 in the US. In Romania, in contrast, that same industry was ranked near the bottom of the tangibility index before the reform (at #16). After the reform, the printing industry in Romania became one of the most intense users of tangible assets (at #32). Panels C and D tell a very similar story, but here Germany is the economy used for benchmarking. The correlation of the tangibility rankings between Romania and Germany jumps from 0.47 to 0.73 after the reform.

Figure 3 suggests that following the collateral reform, firms in Romania display tangible-to-

Figure 4: Evolution of Correlation Between Leverage and Overall Tangibility

The figure plots the evolution of the cross-sectional correlation between *Leverage* and *OverallTangibility* across firms in Romania. We calculate the correlation for each year separately between 1996 and 2005. *Leverage* is defined as the ratio of total debt to total assets. *OverallTangibility* is the ratio of fixed assets to total assets. The gray vertical line denotes the year of the collateral reform.



total asset ratios that resemble more closely those of comparable, credit-unconstrained firms based on either the US or Germany. Prior to the reform, however, Romanian firms' asset mix was very different than those same foreign-based benchmark firms. While space and data constraints preclude us from executing all of our tests using both US-based and German-based indices, our main findings are qualitatively similar across these two benchmarks.

4 The Collateral Channel: Expansion and Democratization of Credit

4.1 Intertemporal Relation between Leverage and Tangibility

The Romanian reform allowed firms to pledge a broader set of tangible assets as collateral to creditors. At a basic level, one would expect to see an increase in the association between tangible assets and leverage following the reform (i.e., the debt capacity of tangible assets). In Figure 4, we plot the evolution of the coefficient of correlation between *Leverage* and *OverallTangibility* across firms for each year between 1996 and 2005. Prior to the reform, the correlation is very low, hovering

around 0.06.[10] After 2000, the correlation increases sharply reaching a value of 0.16, roughly three times the pre-reform estimate. Below, we show that the reform enlarged the debt capacity of tangible assets by allowing firms producing in sectors intensive in movable assets to borrow more.

4.2 The Baseline Empirical Model

We estimate the following difference-in-differences specification to gauge the causal effect of the collateral reform on firm financing:[11]

$$Y_{ist} = \alpha_i + \alpha_t + \beta Post_t * HighAssetType_s + \gamma X_{ist} + \epsilon_{ist}, \tag{3}$$

where Y_{ist} denotes the outcome variable of interest (e.g., *Leverage*) for firm i in sector s in year t. $Post_t$ is a dummy that equals zero before the reform year (2000) and one afterwards. $HighAssetType$ is a dummy that equals one if the firm belongs to the treated group (sectors in the top quartile of a particular sectoral asset type index) and zero if the firm belongs to the control group (sectors in the bottom quartile of the index).[12] X_{ist} denotes a vector of firm-level controls (e.g., *Size*, *Age*, *Profitability*, and *OverallTangibility*), and ϵ_{ist} is the error term. The specification includes a full set of firm-fixed effects (α_i) and year-fixed effects (α_t). The firm-fixed effects control for time-invariant firm characteristics. The year-fixed effects control for aggregate time-varying shocks. The standard errors are clustered at the firm level.[13]

The coefficient of interest is β, measures the pre–post difference in the outcome of interest of firms operating in high-movable assets sectors, relative to the pre–post difference of firms in low-movable assets sectors. A unique characteristic of the collateral reform is that it affected only *movable* assets, not *immovable* assets. This provides for an extra identification wrinkle in our difference-in-differences setting. In particular, one concern with our test is that there could be a concurrent credit supply shock in 2000 and *all* tangible assets — movables and immovables — would appear to be associated with more credit taking, independent of the reform. Since immovable assets were allowed to be pledged before and after the reform, we also estimate Eq. (3) across high- and low-immovable asset categories, and conduct a "falsification test."

[10] For sake of reference, this correlation is 0.33 for US firms during the same period.

[11] In Section 7, we show that the results are robust to using a difference-in-differences matching estimation.

[12] In Section 7, we compare the effects across different quartiles of the movable asset distribution. We also show that the results are robust to using the original (continuous) version of the index.

[13] Our results are robust to collapsing and comparing the data into a pre- and post-reform period, which ensures that the standard errors are not artificially low due to serial correlation (Bertrand et al., 2004).

4.3 Access to Credit: Intensive Margin

Table 2 reports the results for *Leverage*. To build intuition, we start by estimating the effect of the collateral reform across sectors with different intensities in overall asset tangibility, which includes all types of tangible assets (movables and immovables). The estimates in column (1) show that the reform increased leverage in firms operating in sectors with high overall tangibility by 1.2 percentage points more than in firms in low tangibility sectors. This base result is statistically significant, but economically confounded since not all types of fixed assets were affected by the reform. Accordingly, we break the overall tangibility effect into its different components. In particular, since the collateral reform only boosts the pledgeability of movable assets, there should only be an effect in sectors that are intensive users of movable assets. This is what we find. According to column (2), the collateral reform increased leverage of firms in movable-intensive sectors by 2.4 percentage points more than in sectors where firms operate fewer movable assets. The effect is highly significant and of sizable magnitude: it amounts to 23% of the average sample leverage (= 2.4%/10.5%). That is, for firms of the same size, age, profitability, and even overall tangibility, those that operate in sectors that have higher use of movable assets observe a markedly higher use of debt financing following the collateral reform.

TABLE 2 ABOUT HERE

In column (3), we examine the effect on firms that hold different levels of immovable assets. The results show that the collateral reform had no differential impact on the leverage ratio across firms operating in sectors with different usage of immovable assets — assets that were not affected by the reform. In column (4), we conduct a horse-race between the two different components of overall tangibility, by including the interactions between the *Post* dummy and both sectoral indices. The results confirm that the reform increased leverage only in sectors intensive in movable assets. Indeed, the magnitude of the effect for firms in sectors intensive in movable assets becomes larger.

4.4 Access to Credit: Extensive Margin

The evidence above shows that firms operating more movable assets carry more debt in their balance sheets after the collateral reform. From the point of view of promoting access to credit, it is important to know whether firms that previously did not use debt ("zero-leverage firms") are able to use this type of financing after the reform. If this is the case, one may argue that the reform was critical not only in expanding credit across firms that already used debt, but also in leading to a "democratization of credit" across the corporate sector in Romania.

To gauge this effect, we re-estimate Eq. (3) using as dependent variable a dummy that equals one if the firm has no debt in its balance sheet and zero otherwise (*ZeroLeverage*). Since the dependent variable is binary, we estimate a linear probability model. Table 3 reports the results. The collateral reform reduced the probability of a firm having zero leverage in industries intensive in movable assets by 16% more than in industries not intensive in movables (column (2)). This is a sizable magnitude, accounting for 28% of the average fraction of firms with no leverage in the sample (= 16%/57%). As in Table 2, the effect of the reform is uniform across industries with different intensities in immovable assets (column (3)).

TABLE 3 ABOUT HERE

Our finding of the increase in the fraction of firms with greater access to credit is new and deserves further characterization. We do so via a graphical analysis. Within movable-intensive sectors, we divide firms into deciles according to size, where size is measured as number of employees. Figure 5 reports the distribution of the fraction of zero-leverage firms within each size bin for the pre- and post-reform periods (Panels A and B). Before the reform, 83% of the firms in the smallest-size bin had no debt in their balance sheets. This fraction declines as we move towards larger-size bins. After the reform, the fraction of zero-leverage firms declines across all size bins, but the effect is concentrated primarily in the smaller-size bins (deciles 1 through 7). Panels C and D replicate the results for the sectors not intensive in movables. The panels confirm that the effects of the reform on the fraction of zero-leverage firms are only present in sectors that use intensively movable assets. Notably, the previous contrast of zero-leverage firms across high- and low-movable sectors disappears with the reform (compare Panels B and D).

4.5 Demand for Cash Savings

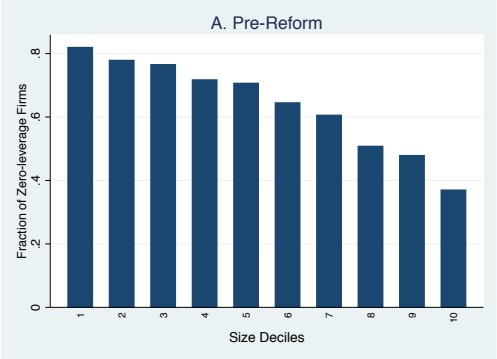
Intuition suggests that firms with an enlarged capacity to borrow need to carry less cash in their balance sheets — carrying cash is expensive if firms have easy access to credit (Acharya et al., 2007). We study the effect of the reform on corporate liquidity to better characterize our results. Savings capture the "dual" of debt, and using this alternative proxy as a dependent variable helps us guard against endogeneity concerns in our leverage tests. In particular, the economic environment in Romania does not suggest any changes on firms' propensity to save around 2000.[14]

We report the results for regressions featuring the ratio of cash to assets as the dependent variable (*Cash*) in Table 4. According to the estimates, the reform reduced cash holdings of firms

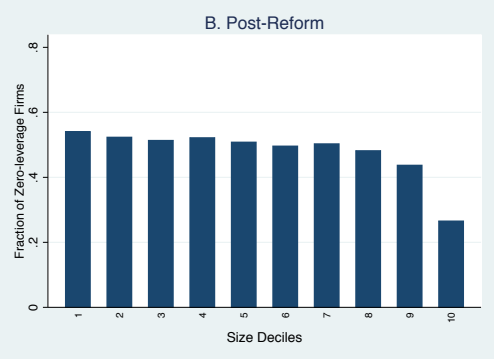
[14]For example, interest rates and tax rates did not change significantly during this period.

Figure 5: Distribution of Zero-leverage Firms Before and After the Reform

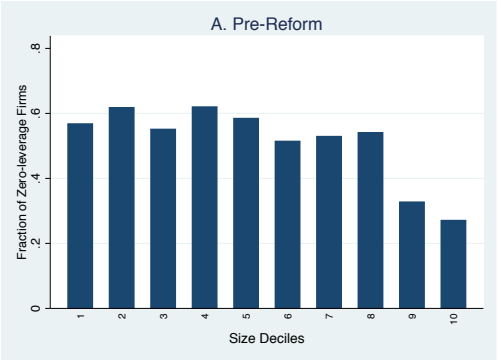
The figure reports the distribution of the fraction of zero-leverage firms. Firms are divided into deciles according to size, where size is measured as number of employees. Panels A and B report the distribution for sectors intensive in movable assets, over the pre- and post-reform periods, respectively. Panels C and D report the distribution for sectors not intensive in movable assets, before and after the reform. Movable-intensive sectors are those above the top quartile of the movable sectoral index; non movable-intensive sectors are those below the bottom quartile of the index.



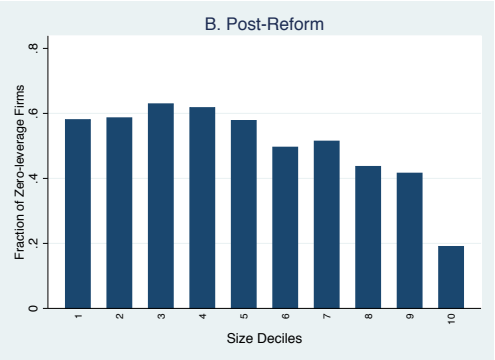
A. Movable intensive sectors



B. Movable intensive sectors



C. Non-movable intensive sectors



D. Non-movable intensive sectors

operating in sectors intensive in movable assets by 1.9 percentage points more than of firms not making intensive use of those assets (column (2)). The effect is sizable, corresponding to 24% of the average cash-to-asset ratio in the sample (= 1.9%/7.9%). Our estimates imply that better contracting terms for movable assets seem to make these assets more liquid and firms respond by moving away from hoarding cash.

TABLE 4 ABOUT HERE

4.6 Real Effects of Access to Credit

Having established that the collateral reform increased access to credit, we take our analysis one step further and look at the real-side implications of these changes. Looking at how financing decisions impact real corporate outcomes like investment and efficiency sets our study apart from others in the literature and highlight the policy relevance of our findings.

For each real variable of interest, Y, we estimate a difference-in-differences estimation contrasting across high- and low-immovable asset categories:[15]

$$Y_{ist} = \alpha_i + \alpha_t + \beta Post_t * HighMovableAsset_s + \epsilon_{ist}, \tag{4}$$

In column (1) of Table 5, we show that the reform increased the investment rate in fixed assets in firms operating in sectors intensive in movables by 3.6 percentage points more than in sectors that do not demand intensively those assets. The magnitude of the effect is sizable, amounting to more than 80% of the average sample investment rate (= 3.6%/4.3%). In column (2), we show that the effect on employment is positive, but is estimated imprecisely (p–value = 0.13). According to column (3), the productivity of firms in sectors with high movable usage increases by 4.8 percentage points. Column (4) shows that profitability increases by 6.7 percentage points. In column (4), we show that sales increase by 8.8 percentage points more in sectors intensive in movable assets.

TABLE 5 ABOUT HERE

The fact that firms invested more in fixed assets following the collateral reform is notable and consistent with a "credit multiplier" effect that has been long emphasized in the literature (e.g., Bernanke et al., 2000).[16] To wit, we have shown in Tables 2 and 3 that following the reform, firms in sectors intensive in movable assets borrowed more. Results in Table 5 suggest that this extra borrowing was partly used to finance the acquisition of fixed assets, including machines and equipment. This further increased the debt capacity of these firms, since they could then pledge the new machines and equipment to borrow more, expanding their ability to acquire additional fixed assets.

There could be several reasons leading to the within-firm productivity improvements reported in Table 5. One possibility is that firms are changing the composition of their assets towards a more efficient mix as they become less credit constrained. The previous results on cash holdings are consistent with this explanation. Firms responded to the reform by shifting away from liquid,

[15] For consistency, we examine a similar specification across all variables considered. In lieu of writing a different specification for each variable, we drop the control set X from all estimations.

[16] Campello and Hackbarth (2012) provide evidence of a firm-level credit multiplier effect in the United States.

idle assets towards more illiquid, productive assets. The tests we perform below shed light on this reallocation of capital type and mix in Romania after the reform.

5 The Legal Channel of Credit Expansion: Bypassing Court Inefficiency

The issue of court efficiency has been highlighted in recent work on credit reforms and our setting provides new insights into this question. Research shows that the success of such reforms depends positively on the efficiency of local courts, the bodies ultimately charged with the application of innovations to legal contracting.[17] The Romanian reform makes local court systems *less* central to debt contracting, relieving both financial and legal constraints to credit expansion. This setting allows us look at how court efficiency modulates the effects of the reform in a novel way, one that reveals the importance of legal constraints to financial contracting. To the extent that court inefficiency constrained access to credit prior to the reform, one would expect pre-reform court efficiency to shape the effects of the reform. In particular, disparities in the local court systems could induce heterogeneous effects on the outcomes associated with the reform, with more pronounced effects in jurisdictions where the judicial system was particularly inefficient. As it turns out, disparities in local court efficiency were salient in Romania before the reform, allowing us to develop our proposed strategy.

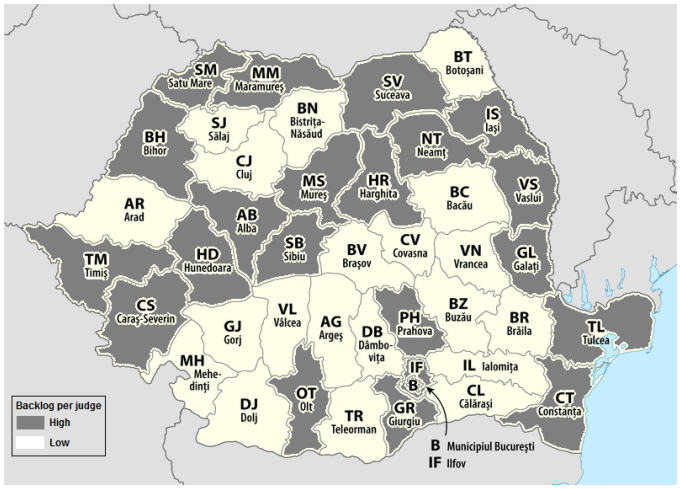
Romania is divided into 41 counties (*judete*), which constitute the official administrative divisions. The territorial organization of the courts corresponds to this administrative structure, with each county housing one *Tribunal*, the court ultimately charged with the handling of commercial cases. Following the literature on judicial efficiency (Ponticelli, 2013), we gather data on the number of pending commercial cases and the number of judges working in each county in 1999 (from Murrell, 2001). With this data, we create a proxy for court efficiency based on the (inverse) ratio of the number of cases pending in backlog before each court and the number of judges working in that court over the same period. Table 6 reports this information for the 41 Romanian counties in 1999, the year prior to the reform. The country's average backlog per judge is 15 cases, but the table shows substantial variation in court efficiency across counties. On one extreme, Vrancea county has only two cases pending per judge, and on the other extreme, Bihor county has 51 cases.[18] The

[17] Ponticelli (2013) shows that a bankruptcy reform in Brazil only had its intended consequences of facilitating bankruptcy proceedings in jurisdictions where local courts were efficient. See also Chemin (2010).

[18] Pronounced differences exist even inside homogeneous regions of the country. In the Transylvania region, Cosvana county has a backlog of four cases per judge, while its neighbor Mures county has a backlog of 38 cases.

Figure 6: Map of Court Efficiency Across Romania's Counties

The figure plots the map of the 41 counties of Romania, which constitute the territorial organization of the courts. The counties have been divided into two groups: above the median of backlog per judge in 1999 (grey) and below the median (white). Backlog per judge is the ratio between the number of pending cases in a court at the beginning of the year and the number of judges working in that court over the same year.



backlog per judge in Bucharest-Ilfov, the county encompassing the country's capital, is 29.

Table 6 About Here

Differently from other countries, the Romanian law does not allow creditors or firms to choose the county in which to file a legal motion (no "forum shopping"). As a result, the legal proceedings of commercial cases are shaped by the efficiency of local courts. To gauge how pre-reform court efficiency influences post-reform outcomes, we divide our sample firms into two groups: those operating in counties above the country's median backlog per judge and those in counties below that cutoff. Figure 6 shows a map of the counties in Romania separated into these two court-efficiency categories. According to the map, efficient and inefficient court districts are interspaced across the country. We fail to identify any significant correlation between this dispersion and other county-level indicators, such as local GDP and local population. Nonetheless, we find it sensible to scale our measure of court efficiency by the number of firms in each county. This measure is presented in column (4) of Table 6.[19]

In Table 7, we re-estimate Eq. (3) separately for firms located in high vis-à-vis low court-

[19]Our results are robust to directly using backlog per judge as our measure of court efficiency.

efficiency counties (measured by the case backlog per judge, scaled by local firm population). In the sample of high-backlog counties (Panel A), the reform increased the leverage of firms operating in industries that make intensive use of movable assets by 3.7 percentage points more than in non-intensive industries (see column (1)). In low-backlog counties (Panel B), in contrast, the leverage effect amounts to less than one third of the effect observed in high-backlog counties. The movables effect on the probability of having zero leverage is negative and significant in both samples; however, the effect is nearly 30% larger in counties with high backlog (column (2)). Finally, while the effect of movables on cash savings following the reform is large and statistically significant in high-backlog counties, it is negligible in low-backlog counties (column (3)).

TABLE 7 ABOUT HERE

In unreported tests, we constrain our comparison to counties that are geographically adjacent to each other. To further ensure homogeneity, we constrain our comparisons to firms in the Transylvania region. This helps fence our tests against concerns that unobserved local business conditions might confound our court-efficiency results. Even at this granular level, we find that the average difference-in-differences result for leverage is about 4 percent in the four high-backlog counties in Transylvania and less than 1 per cent in the four low-backlog counties.

In all, our county-level analysis shows that a reform that diminishes the importance of court involvement helps precisely those firms operating in localities with most inefficient courts systems. While consistent with existing work on the importance of court efficiency, our findings push knowledge further in showing that reforms that make courts less important are beneficial to contracting, particularly in places where legal frictions are most pronounced.

6 Broader Economic Consequences of the Reform

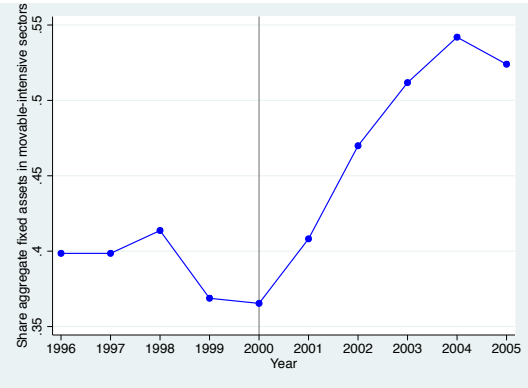
While it is important to measure the effects of enhanced access to credit at the firm level, policymakers are ultimately interested in the aggregate consequences of the collateral reform. In this section, we analyze whether the reform changed the industrial structure of the economy towards sectors intensive in movable assets. We also assess the extent to which the reform contributed to the increase in financial depth observed in Romania between 1996 and 2005.

6.1 Industrial Composition Effects

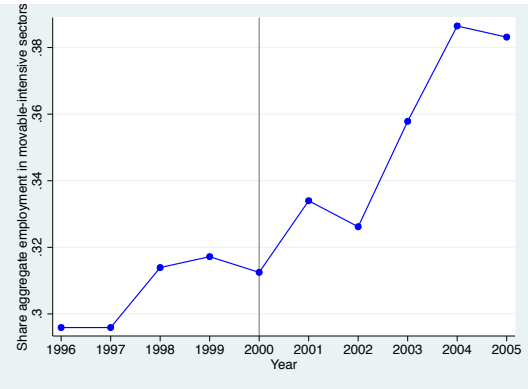
Under an arcane legal framework, movable assets cannot be pledged as collateral and become "dead capital." By allowing movable assets to be pledgeable, the 2000 reform should trigger a

Figure 7: Share of Fixed Assets and Employment in Movable-intensive Sectors

The figure plots the evolution of the share of aggregate fixed assets (Panel A) and the share of aggregate employment (Panel B) allocated to sectors intensive in movable assets, for the period 1996-2005. Movable-intensive sectors are defined as those above the top quartile of the movable assets sectoral index.



A. Share of Aggregate Fixed Assets



B. Share of Aggregate Employment

factor reallocation process, changing the industrial composition of Romania towards sectors intensive in movables. The results in Table 5 suggest this effect working at the firm level. The results from the table also indicate that firms become more efficient and profitable, which also points to improvements in the mix of different types of assets used by individual firms. It is important, however, to assess the aggregate implications of such findings.

To do this, we calculate the share of aggregate fixed assets and aggregate employment allocated to sectors intensive in movable assets. In Figure 7, we plot the evolution of these shares over the 1996–2005 period. According to Panel A, before the reform, roughly 40% of total fixed assets in the economy were used in movable intensive sectors. After the reform, this share increases steadily, reaching nearly 55%. Likewise, from Panel B, we observe that the share of labor allocated to sectors intensive in movables increases from roughly 30% in 1996 to more than 38% in 2005. The reform therefore led to a fast and pronounced change in the country's industrial structure and asset utilization mix.

6.2 Financial Deepening

In Section 2, we documented that financial depth in Romania increased substantially after 2000. Countries strive to achieve higher levels of financial deepening as this is thought to facilitate economic growth. While it is difficult to assess how much a given policy contributes to this goal, in

this section we conduct a back-of-envelope calculation to gauge the contribution of the collateral reform to the financial deepening taking place between 1996 and 2005. Since we want to sum of the effect across all sectors (not only the top and bottom quartiles), we start by re-writing Eq. (3) using the original sectoral index of machinery and equipment:

$$Leverage_{ist} = \alpha_i + \alpha_t + \beta Post_t * Mach\&Equip_s + \gamma X_{ist} + \epsilon_{ist}, \tag{5}$$

where $Mach\&Equip$ is the original (continuous) sectoral movable intensity index. We sort all sectors in ascending order according to $Mach\&Equip$. We denote the pre–post change in sectoral leverage as $\Delta Leverage_s$. As such, according to Eq. (5), the sectoral change in leverage in two consecutive sectors is: $\Delta Leverage_s - \Delta Leverage_{s-1} = \beta(Mach\&Equip_s - Mach\&Equip_{s-1})$. We define the aggregate effect of the reform as:

$$\Delta Leverage = \sum_{s \geq 0} \omega_s Leverage_s,$$

where ω_s denotes the share of fixed assets of sectors s to aggregate fixed assets. Our empirical methodology gives an expression for the *differential* effect of the reform across industries. In order to pin down the *level* effect, we assume that the change in the sector with lowest $Mach\&Equip$ is zero, which implies that $\Delta Leverage_s = \beta(Mach\&Equip_s - Mach\&Equip_0)$, for $s > 0$. By doing this, we estimate a lower bound of the reform's aggregate effect:

$$\Delta Leverage = \beta \sum_{s>0} \omega_s (Mach\&Equip_s - Mach\&Equip_0)$$

According to the dosage regression described below in Section 7, we know that $\beta = 0.047$. According to the data, $\sum_{s>0} \omega_s (Mach\&Equip_s - Mach\&Equip_0) = 0.257$. Therefore, the aggregate effect is $0.047 * 0.257 = 1.23\%$. Finally, note that financial depth is defined as the ratio of private credit to GDP, not to assets. Since $Leverage = Debt/Assets$, we can re-write the aggregate effect as: $\Delta Leverage = \Delta[(Debt/GDP) * (GDP/Assets)]$. Following the macro literature, we assume that the ratio of total assets to GDP is 2.5, which for simplicity we assume to be unchanged by the reform. As a result, we have that:

$$\Delta(Debt/GDP) = (Assets/GDP) * \Delta Leverage = 2.5 * 1.23\% = 3.08\%$$

According to Figure 1, the average pre–post change in financial depth in Romania over the 1996–2005 period is 4.31% (= 13.6% − 9.3%). Therefore, our back-of-the-envelope calculation implies that the collateral reform explains 71% of this financial deepening (= 3.08%/4.31%), which is a sizable contribution.

7 Robustness, Validity, and Consistency Checks

While attractive for identification purposes, difference-in-differences test strategies naturally call for checks on several dimensions. We conduct multiple tests designed to check the robustness, external validity, and internal consistency of our base results.

7.1 Parallel Trends

Our difference-in-differences strategy assumes that, in absence of the reform, the change in the outcome variables (e.g., *Leverage*) would have been the same for firms in the treated and control groups (i.e., firms above the top quartile and below the bottom quartile of the movables index, respectively). Accordingly, it is important to check whether trends in the outcome variables of interest for both groups were similar ("parallel") prior to the reform. We do so looking at the secular evolution of changes in leverage ratios, the proportion of zero-leverage firms, and cash holdings before the reform. Panel A of Table 8 reports the results for *Leverage*. The difference between the change in leverage for the treated and control groups is not statistically different from zero. This holds for all pre-reform horizons we consider, going back up to the beginning of our sample period in 1996. Panels B and C show similar patterns for *ZeroLeverage* and *Cash* for the two comparison groups. In sum, there are no discernible differences in trends for either debt or cash ratios for firms in the high and low movable assets categories before the 2000 reform.

Table 8 About Here

7.2 Confounding Effects

Another concern with our difference-in-differences strategy is that there could have been confounding events causing users of movable assets to use more debt after 2000. We tackle this concern by utilizing a measure of business cycle sensitivity and by conducting a cross-country placebo test.

7.2.1 Sensitivity to Business Cycle

One threat to identification is that different industries react differently to the business cycle. Romania experienced the start of an economic recovery in 1998, two years before the collateral reform. Even though there is time lag between the recovery and the reform, it is possible that industries intensive in movable assets are also more sensitive to business cycle movements. This would mean that even in the absence of the reform, leverage would increase in movable-intensive industries as a result of higher credit demand. To study this possibility, we introduce an index of sectoral business

cycle-sensitivity in our analysis. Using data from UNIDO over the 1990–2010 period, we define the sensitivity index as the coefficient of correlation between sectoral output and countrywide output.[20]

The correlation between the sectoral movable assets index and the cycle sensitivity index is only 0.17; hence, it is unlikely that our results are driven by a differential response to the business cycle. To rule out this alternative formally, we create a dummy variable denoted $HighSensitivity$, which is equal to one for sectors in the top quartile of the cycle sensitivity index and zero for sectors in the bottom quartile. We re-estimate Eq. (3) adding an interaction term between the post variable and the cycle sensitivity dummy. The results are reported in Table 9.

TABLE 9 ABOUT HERE

As expected, our estimations show that leverage increases in sectors responsive to the cycle after 2000, by the same token firms accumulate less cash. Notably, however, the effect of the reform on *Leverage*, *ZeroLeverage*, and *Cash* in sectors with different movables-intensity remains significant and similar in magnitude to our benchmark estimates. Thus, our results are not confounded by economic movements that may affect sectors differentially.

7.2.2 Placebo Tests

Another threat to identification is the existence of sectoral shocks specific to movable-intensive sectors, which increase the demand for credit. To rule out this alternative, we conduct a placebo test looking at countries exposed to similar sectoral shocks. Our premise is that industry shocks that could confound our results would affect not only Romania, but also its neighbors and main commercial partners. Our experiment falsely assumes that the three neighbors of Romania for which we have data (Bulgaria, Hungary, and Ukraine) and its main commercial partner (Italy) passed collateral reforms the same year than Romania.[21]

We start by providing evidence that the change in leverage in movable-intensive sectors in Romania prior to 2000 is not statistically different from the change in leverage in movable sectors in its three neighbors and its main commercial partner.[22] Next, we re-estimate Eq. (3) separately for each of the three countries. Table 10 reports the results. Each estimation shows that there is no effect on the credit capacity of firms operating in high-movable assets industries. Since we only observe a 2000-specific effect in Romania, the results from Table 10 suggest that our results are

[20] UNIDO's Industrial Statistics Database (INDSTAT) provides industrial indicators for 127 countries from 1990 to 2010. We construct the index using data from Romania, but results are robust to using an index based on US data.

[21] Italy amounts to 20% of Romania's total exports and 23% of its total imports.

[22] The results, which are not reported to conserve space, are available upon request.

not driven by industry-specific shocks affecting firms in industries operating more movable assets.

TABLE 10 ABOUT HERE

7.3 Matching Estimations

Another concern with the difference-in-differences estimation is that firms in movable-intensive and non-intensive industries may be very different regarding the covariates used as controls in our regressions. Our method may render inflated estimates if covariates do a poor job of ensuring well-suited comparisons between treated and control units. Given that the treated and control units belong to different industries, we examine if this concern impacts our results.

We start by comparing the covariates we use as controls in our regressions across firms operating in movable-intensive sectors (treatment group) and firms in non-intensive sectors (control). The comparison is reported in Panel A.1 of Table 11, where median difference tests suggest that firms in the treated and control groups are particularly different in dimensions such as size and age.

We use the Abadie and Imbens (2006) matching estimator to tackle concerns about poor covariate overlap. The Abadie-Imbens estimator minimizes the Mahalanobis distance between the vectors of observed covariates across treated and non-treated units, finding controls based on matches for which the distance between the vectors is smallest. Our matching procedure takes each firm operating in a movable-intensive sector and finds the firm in a non-intensive sector that is closest in terms of each one of the four covariates (covariate-by-covariate matching). The tests reported in Panel A.2 of Table 11 show the success of our matching: the median size, age, profitability, and overall tangibility is virtually identical across firms in the high- and low-movables sectors after the matching is performed.

We proceed to perform differences-in-differences tests computing the Abadie-Imbens' average treatment effect on the treated (ATT) estimate. We report the results for our main outcome variables (*Leverage*, *ZeroLeverage*, and *Cash*) in Panel B of Table 11. For ease of reference, we also report the benchmark regression results associated with these same outcomes, collected from Tables 2, 3, and 4. The estimates are remarkably similar across the two methodologies, leading to the same economic inferences regarding the impact of the collateral reform on firms' access to credit.

TABLE 11 ABOUT HERE

7.4 Internal Consistency of Estimates

According to our results, the collateral reform increased leverage in firms operating in industries intensive in movable assets by 2.4 percentage points more than in firms in non-intensive industries. In this section, we study whether this estimate is sensible given the setting in which our analysis takes place. In particular, we compare this number with would have happened if firms had pledged *all* their movable assets to secure new debt financing after 2000 — the upper bound of the collateral impact on debt capacity.

To estimate how much debt firms could have raised, we calculate the product between the liquidation value of movable assets and the amount creditors lend against each dollar of movables in liquidation (the loan-to-value ratio). The liquidation value of movables, in turn, equals the product between the book value of movables and the liquidation value creditors recover for each dollar of book value of movables. Our upper bound calculation takes the form:

$$\frac{DebtLimit}{Assets} = \underbrace{\frac{Mach\&Equip}{Assets} * \frac{LiquidationValue}{Mach\&Equip}}_{\text{Liquidation Value of Movables}} * \underbrace{\frac{DebtLimit}{LiquidationValue}}_{\text{Loan-to-value of Movables}} \tag{6}$$

We start by considering firms producing in movable-intensive sectors. On average, the ratio of the book value of machinery and equipment to assets of firms in the treated group is 27.3% (i.e., $Mach\&Equip/Assets = 0.273$) . To establish a link between book and liquidation value of movables, we follow Berger et al. (1996), who report that a dollar's book value of fixed assets produces 54 cents in liquidation value in the United States (i.e., $LiquidationValue/Mach\&Equip = 0.54$).[23] Finally, to calculate how much debt firms could have raised with this liquidation value, we follow Calomiris et al. (2014), who report that a dollar's liquidation value of machinery and equipment in Romania in 2004 raises up to 40 cents of debt (i.e., $DebtLimit/LiquidationValue = 0.4$).[24]

From Eq. (6), we calculate that firms producing in movable-intensive sectors could have raised debt equal to 5.8% of total assets ($= 0.273 * 0.54 * 0.4$). For firms in the control group, the average ratio of the book value of machinery and equipment to assets is 12.2%. This implies that firms producing in non-intensive sectors could have raised debt equal to 2.6% of total assets ($= 0.122 * 0.54 * 0.4$). According to this counterfactual calculation, the reform could have increased leverage

[23] We do no have this valuation proxy for Romania and imagine the actual number might be lower than 0.54. Since our exercise concerns the estimation of an upper bound for debt capacity, we adopt the high US-based figure.

[24] This number is calculated as the average ratio between the loan granted and the liquidation value of the asset pledged as collateral. The data used in Calomiris et al. (2014) comes from a large multinational bank, which provides detailed loan-level information, including an internal assessment of the liquidation value of the asset being pledged.

in firms in movable intensive sectors by 3.2 percentage points more than in firms in non-intensive sectors ($= 5.8\% - 2.6\%$). Our 2.4 estimate can be seen as relevant and fairly close to this counterfactual upper bound in which firms pledge all their movable assets as collateral after the reform.

7.5 Dosage Effects

Throughout the paper, we have defined the treated group as the firms in sectors in the top quartile of the movable assets index and the control group as the firms in the bottom quartile. In this section, we look into "dosage effects" of the collateral reform, by comparing outcomes across different quartiles of the movable assets distribution. If our test strategy is sound, we would expect differences in outcomes to be larger (smaller) the farther (closer) is the distance between treated and control groups in the movables distribution. In this exercise, we first classify as treated those sectors in the third quartile and as control the sectors in the bottom quartile. We then classify as treated the sectors in the third quartile and as control the sectors below the second quartile. Finally, in order to fully exploit the information in the movables sectoral distribution, we use the original (continuous) movables index instead of the binary version.

Table 12 reports the results. For ease of comparison, column (1) re-displays the results for our benchmark treated–control classification. Column (2) reports the results for the first alternative classification, where we compare firms in the third and first quartiles of the index. As expected, the effect is smaller in magnitude and estimated less precisely than in the benchmark case. Column (3) reports the results for the second alternative classification. In this case, the effect is not statistically different from zero. In sum, if we compare sectors closer within the movable assets distribution, the observed effects are smaller. In the last column of the table, we use the original index. According to the results, the effect of the reform is increasing in the movable intensity of the sector (the point estimate is 0.047). This means that our results about the impact of the reform are robust to how we treat the movables asset index for testing.

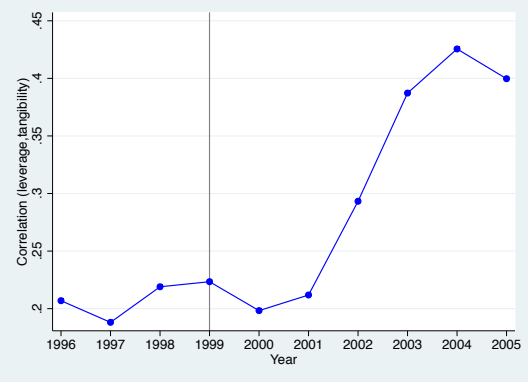
Table 12 About Here

8 Cross-Country Analysis

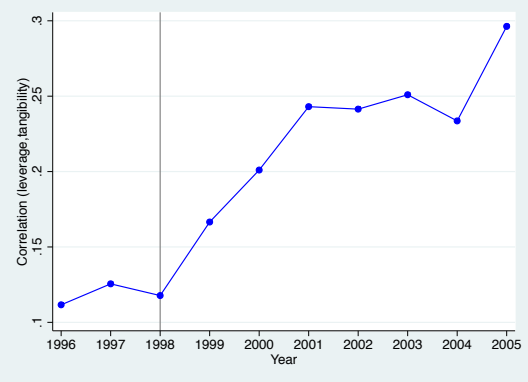
An important advantage of our test setting is that we can extend our study to a multi-country analysis. We have collected information on collateral reform dates for nine additional Eastern European countries. While these economies are similar in a number of dimensions — they inherent much of the same legacy of centralized, socialist-oriented, large manufacturing base — the passage

Figure 8: Evolution of Correlation Between Leverage and Overall Tangibility: Latvia and Poland

The figure plots the evolution of the cross-sectional correlation between *Leverage* and *OverallTangibility* across firms in Latvia (Panel A) and Poland (Panel B). We calculate the correlation for each year separately between 1996 and 2005. *Leverage* is defined as the ratio of total debt to total assets. *OverallTangibility* is the ratio of fixed assets to total assets. The gray vertical lines denote the collateral reform dates.



A. Leverage-tangibility correlation in Latvia



B. Leverage-tangibility correlation in Poland

of collateral reforms was not contemporaneous, owing to various idiosyncrasies. Some of these countries have reformed their collateral frameworks early on (Bulgaria, Estonia, Hungary, and Lithuania); others reformed in the middle of our sample window (Latvia and Poland); and others did not implement reforms over the time period we study (Czech Republic, Ukraine, and Russia). For ease of reference, Table 13 reports the relevant details of the collateral reforms observed in the countries in the region between 1996 and 2005.

TABLE 13 ABOUT HERE

We start by plotting the evolution of the cross-sectional correlation between overall tangibility and leverage in Latvia and Poland (the two other countries enacting collateral reforms within our sample period). Figure 8 shows a pronounced increase in the tangibility–leverage relation after the reforms passed in Latvia in 1999 and Poland in 1998. Like the case of Romania, the debt capacity of tangible assets increased after these two countries passed the collateral laws.

In order to show that this increased debt capacity is the result of larger collateral menus, we estimate the following generalized difference-in-differences specification:

$$Y_{isct} = \alpha_i + \alpha_{ct} + \beta Post_{ct} * HighMovableAssets_s + \gamma X_{isct} + \epsilon_{isct}, \tag{7}$$

where Y_{isct} denotes the outcome variable of interest for firm i in sector s in country c in year t. $Post_{ct}$ is a dummy equal to zero before the reform date and one afterwards for each country. $HighMovableAssets_s$ is the sectoral treatment indicator. The specification includes a full set of firm-fixed effects (α_i) and country-year-fixed effects (α_{ct}). The country-year-fixed effects control for all country-level, time-varying shocks. This constitutes a major advantage of this specification. The standard errors are clustered at the country level.

Table 14 reports the cross-country results. Columns (1) through (3) report the results for the financial outcomes, while columns (4) through (8) refer to the real corporate outcomes. Collateral reforms aimed at freeing "dead capital" increased leverage in firms operating in sectors intensive in movable assets by 4.1 percentage points more than in firms in non-intensive sectors (column (1)). In addition, the reform reduced the probability of having zero leverage by 18% (column (2)). The effect on cash holdings is, as before, negative and significant (column (3)). Regarding the real outcomes we consider, the reform led to higher investment in fixed assets (column (4)), higher employment (column (5)), higher productivity (column (6)), higher profitability (column (7)), and increased sales (column (8)). These results add external validity to our analysis and suggest that the gains associated to policies that ease contracting among parties are not specific to the Romanian context. Such policies seem to have potentially positive effects in other comparable contexts as well.

Table 14 About Here

9 Concluding Remarks

Until the mid 1990s, the legal framework for secured transactions in Eastern Europe was very weak. For practical purposes, creditors accepted only immovable assets (land and buildings) as collateral; they did not accept movable assets (machinery and equipment). As a result, movable assets did not have debt capacity and were considered "dead capital." In 2000, Romania passed a law that drastically improved the legal treatment of movable assets as collateral. In this paper, we study the impact of this reform on the availability of credit and real economic activity in Romania. We conduct a difference-in-differences test where we contrast firms operating in sectors with high and low demand for movable assets, before and after the passage of the law.

We find that after the reform, firms operating in sectors with more intensive use of movable assets borrowed significantly more and hoarded less cash. Moreover, the reform allowed a high fraction of firms that were entirely financed with equity to raise debt for the first time, leading to a

"democratization of credit." We take our analysis one step further and study the real-side implications of the increased credit availability. According to our results, after the law was passed, firms in movable-intensive sectors invested more in fixed assets, employed more workers, and became more productive and profitable. We generalize our analysis to a broader group of nine additional Eastern European countries, passing similar laws during the same sample period. We observe the same pattern of findings in this broader sample, which adds external validity to our results.

From an aggregate perspective, we show that the reform contributed substantially to the process of financial deepening in Romania. In addition, the reform had a profound effect in the industrial structure of the economy, leading to an increase in the share of aggregate fixed assets and employment allocated to sectors intensive in movable assets. Finally, since the law allowed creditors to bypass the court system to repossess collateral, we explore how our results were shaped by the pre-reform efficiency of local courts. We find that the effects on access to credit were more pronounced in the jurisdictions were local courts were initially more congested. This finding highlights the advantages of reforming creditor rights in a manner that de-links them from court procedures.

By emphasizing a detailed, micro-level analysis of the impact of collateral laws that affect different types of assets differentially, we are able to describe the dynamics of the relation between the development of financial institutions — in particular, laws governing financial contracting terms — and economic activity. In this way, our results are markedly important for policy-makers in developing economies, who do not have control over collateral values or their supply in secondary markets, yet can alter collateral menus as a way to enhance financial contractibility.

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Table 1: Summary Statistics of Main Variables

The table reports the summary statistics of the main variables used in the paper, for the period 1996-2005. *Leverage* is defined as the ratio of total debt to total assets; *ZeroLeverage* is a dummy equal to one if a firm has zero leverage and zero otherwise; *OverallTangibility* is the ratio of fixed assets to total assets; *Cash* is the ratio of cash holdings to total assets; *Size* is the log of total assets; *Age* is the number of years in operation; *Profitability* is the ratio of EBIT to assets; *Sales* is the log of sales; *Investment* is the ratio between the change in fixed assets plus depreciation and lagged fixed assets; *Employment* is the log of the number of employees; and *TFP* is the log of total factor productivity.

	Mean	Std Dev	p25	p50	p75	Obs
Leverage	0.105	0.229	0.000	0.000	0.076	209415
ZeroLeverage	0.572	0.495	0.000	1.000	1.000	238558
OverallTangibility	0.383	0.248	0.176	0.365	0.570	238412
Cash	0.079	0.140	0.000	0.019	0.088	225707
Size	11.116	2.182	9.616	10.978	12.437	238558
Age	6.621	3.266	4.000	6.000	9.000	231813
Profitability	0.116	0.355	0.000	0.088	0.272	223124
Sales	11.716	2.069	10.278	11.581	13.015	238558
Investment	0.043	0.499	0.000	0.061	0.200	168805
Employment	2.258	1.625	1.099	1.946	3.135	238558
TFP	9.448	1.225	8.592	9.393	10.267	238558

Table 2: Effect of Collateral Reform on Leverage: Intensive Margin

The table presents the results from the following regression:

$$Leverage_{ist} = \alpha_i + \alpha_t + \beta Post_t * HighAssetType_s + \gamma X_{ist} + \epsilon_{ist},$$

where *Leverage* is the ratio of total debt to total assets for firm i in sector s in year t. *Post* is a dummy equal to zero before the reform date and one afterwards. $HighAssetType_s$ is a dummy defined for each asset tangibility index of sector s. The dummy is equal to one for all sectors above the top quartile of the corresponding sectoral index and zero for sectors below the bottom quartile. X is a vector of firm controls. The specification includes a full set of firm-fixed effects (α_i) and year-fixed effects (α_t). The standard errors are clustered at the firm level.

	(1)	(2)	(3)	(4)
*Post*High OverallTangibility*	0.012**			
	(0.006)			
*Post*High MovableAssets*		0.024***		0.037***
		(0.006)		(0.013)
*Post*High ImmovableAssets*			0.005	-0.019
			(0.006)	(0.013)
Size	0.017***	0.018***	0.019***	0.019***
	(0.002)	(0.002)	(0.002)	(0.002)
Age	0.009***	0.008***	0.010***	0.009***
	(0.001)	(0.001)	(0.001)	(0.001)
Profitability	-0.061***	-0.061***	-0.064***	-0.062***
	(0.004)	(0.004)	(0.004)	(0.004)
OverallTangibility	0.022***	0.019***	0.021***	0.019***
	(0.006)	(0.006)	(0.006)	(0.006)
Firm-fixed effects	Yes	Yes	Yes	Yes
Year-fixed effects	Yes	Yes	Yes	Yes
Observations	111,959	111,880	110,240	90,492
R-squared	0.584	0.584	0.585	0.580

Table 3: Effect of Collateral Reform on Leverage: Extensive Margin

The table presents the results from the following linear probability regression:

$$ZeroLeverage_{ist} = \alpha_i + \alpha_t + \beta Post_t * HighAssetType_s + \gamma X_{ist} + \epsilon_{ist},$$

where *ZeroLeverage* is a dummy equal to one if firm i in sector s in year t has zero leverage and zero otherwise. *Post* is a dummy equal to zero before the reform date and one afterwards. $HighAssetType_s$ is a dummy defined for each asset tangibility index of sector s. The dummy is equal to one for all sectors above the top quartile of the corresponding sectoral index and zero for sectors below the bottom quartile. X is a vector of firm controls. The specification includes a full set of firm-fixed effects (α_i) and year-fixed effects (α_t). The standard errors are clustered at the firm level.

	(1)	(2)	(3)	(4)
*Post*High OverallTangibility*	-0.133**			
	(0.057)			
*Post*High MovableAssets*		-0.159***		-0.324
		(0.056)		(0.337)
*Post*High ImmovableAssets*			0.017	0.184
			(0.139)	(0.338)
Size	-0.052***	-0.053***	-0.074***	-0.052***
	(0.002)	(0.002)	(0.003)	(0.002)
Age	-0.283***	-0.281***	-0.297***	
	(0.012)	(0.012)	(0.018)	
Profitability	0.057***	0.058***	0.068***	0.058***
	(0.005)	(0.005)	(0.005)	(0.006)
OverallTangibility	-0.116***	-0.111***	-0.109***	-0.111***
	(0.010)	(0.010)	(0.011)	(0.012)
Firm-fixed effects	Yes	Yes	Yes	Yes
Year-fixed effects	Yes	Yes	Yes	Yes
Observations	124,257	123,946	122,719	100,331
R-squared	0.635	0.634	0.635	0.631

Table 4: Effect of Collateral Reform on Cash Holdings

The table presents the results from the following regression:

$$Cash_{ist} = \alpha_i + \alpha_t + \beta Post_t * HighAssetType_s + \gamma X_{ist} + \epsilon_{ist},$$

where *Cash* is the ratio of cash holdings to total assets for firm i in sector s in year t. *Post* is a dummy equal to zero before the reform date and one afterwards. $HighAssetType_s$ is a dummy defined for each asset tangibility index of sector s. The dummy is equal to one for all sectors above the top quartile of the corresponding sectoral index and zero for sectors below the bottom quartile. X is a vector of firm controls. The specification includes a full set of firm-fixed effects (α_i) and year-fixed effects (α_t). The standard errors are clustered at the firm level.

	(1)	(2)	(3)	(4)
*Post*High OverallTangibility*	-0.017***			
	(0.004)			
*Post*High MovableAssets*		-0.019***		-0.026***
		(0.004)		(0.010)
*Post*High ImmovableAssets*			-0.016	0.010
			(0.009)	(0.009)
Size	-0.014***	-0.015***	-0.015**	-0.015***
	(0.001)	(0.001)	(0.005)	(0.001)
Age	0.011***	0.011***	0.011***	0.011***
	(0.001)	(0.001)	(0.002)	(0.001)
Profitability	0.067***	0.068***	0.065***	0.067***
	(0.002)	(0.002)	(0.007)	(0.003)
OverallTangibility	-0.050***	-0.051***	-0.053***	-0.053***
	(0.003)	(0.003)	(0.014)	(0.003)
Firm-fixed effects	Yes	Yes	Yes	Yes
Year-fixed effects	Yes	Yes	Yes	Yes
Observations	123,805	123,510	122,298	99,968
R-squared	0.624	0.623	0.627	0.619

Table 5: Effect of Collateral Reform on Other Corporate Outcomes

The table presents the results from the following regression:

$$Y_{ist} = \alpha_i + \alpha_t + \beta Post_t * HighMovableAssets_s + \epsilon_{ist},$$

where Y is the outcome variable for firm i in sector s in year t. *Post* is a dummy equal to zero before the reform date and one afterwards. $HighMovableAssets_s$ is a dummy equal to one for all sectors above the top quartile of the movable assets index and zero for sectors below the bottom quartile. The specification includes a full set of firm fixed effects (α_i) and year-fixed effects (α_t). The standard errors are clustered at the firm level. *Investment* is the ratio between the change in fixed assets plus depreciation and lagged fixed assets; *Employment* is the log of number of employees; *Productivity* is the log of total factor productivity; *Profitability* is the ratio between EBIT and total assets; and *Sales* is the log of sales.

	(1) *Investment*	(2) *Employment*	(3) *Productivity*	(4) *Profitability*	(5) *Sales*
*Post*High MovableAssets*	0.036**	0.040	0.048*	0.067**	0.088***
	(0.017)	(0.027)	(0.025)	(0.032)	(0.033)
Firm-fixed effects	Yes	Yes	Yes	Yes	Yes
Year-fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	131,513	185,730	185,730	176,542	185,730
R-squared	0.499	0.921	0.823	0.414	0.916

Table 6: Court Enforcement Efficiency Across Romanian Counties

The table presents the court enforcement quality data for the 41 counties in Romania. Each county has one *Tribunal* court, which is a first instance court that has separate sections, one handling only commercial cases. Column (1) reports the number of judges in each *Tribunal* court during 1999, the year before the reform. Column (2) reports the initial stock of commercial cases at the beginning of 1999. Column (3) reports the backlog per judge, which is the number of initial pending cases per judge. Column (4) reports the backlog per judge per firm, which is the backlog per judge divided by the number of firms in the county.

County Name	(1) Number of judges	(2) Initial stock of cases	(3) Backlog per judge	(4) Backlog per judge per firm
Alba	15	312	20.8	0.014
Arad	20	133	6.7	0.004
Arges	28	179	6.4	0.004
Bacau	23	237	10.3	0.006
Bihor	16	817	51.1	0.021
Bistrita-Nasaud	16	133	8.3	0.006
Botosani	18	148	8.2	0.012
Braila	17	125	7.4	0.011
Brasov	29	322	11.1	0.006
Bucharest - Ilfov	94	2720	28.9	0.003
Buzau	25	86	3.4	0.003
Calarasi	10	117	11.7	0.026
Caras-Severin	16	199	12.4	0.017
Cluj	27	263	9.7	0.004
Constanta	28	1092	39.0	0.023
Covasna	8	36	4.5	0.006
Dâmbovita	26	180	6.9	0.009
Dolj	31	246	7.9	0.006
Galati	19	343	18.1	0.020
Giurgiu	9	124	13.8	0.049
Gorj	28	92	3.3	0.005
Harghita	9	160	17.8	0.012
Hunedoara	21	306	14.6	0.011
Ialomita	12	127	10.6	0.026
Iasi	23	582	25.3	0.015
Maramures	18	259	14.4	0.008
Mehedinti	25	85	3.4	0.009
Mures	17	646	38.0	0.021
Neamt	23	757	32.9	0.019
Olt	23	466	20.3	0.035
Prahova	26	462	17.8	0.009
Salaj	10	70	7.0	0.013
Satu Mare	18	261	14.5	0.013
Sibiu	18	383	21.3	0.013
Suceava	22	599	27.2	0.017
Teleorman	14	97	6.9	0.017
Timis	25	567	22.7	0.011
Tulcea	11	146	13.3	0.032
Vâlcea	25	125	5.0	0.005
Vaslui	15	419	27.9	0.040
Vrancea	21	48	2.3	0.003

Table 7: Effect of Collateral Reform, by Court Enforcement Efficiency

The table presents the results from the following regression:

$$Y_{ist} = \alpha_i + \alpha_t + \beta Post_t * HighMovableAssets_s + \gamma X_{ist} + \epsilon_{ist},$$

where Y is the outcome variable for firm i in sector s in year t. *Post* is a dummy equal to zero before the reform date and one afterwards. $HighMovableAssets_s$ is a dummy equal to one for all sectors above the top quartile of the movable assets index and zero for sectors below the bottom quartile. Panel A reports the results for the sample of counties with backlog per judge per firm above the median across counties; panel B reports the results for the sample of counties below the median. Backlog per judge per firm is the number of initial pending cases per judge in 1999, scaled by the number of firms operating in the county. X is a vector of firm controls. The specification includes a full set of firm-fixed effects (α_i) and year-fixed effects (α_t). The standard errors are clustered at the firm level. *Leverage* is the ratio of total debt to total assets, *ZeroLeverage* is a dummy equal to one if a firm has zero leverage and zero otherwise, and *Cash* is the ratio of cash holdings to total assets.

	(1) *Leverage*	(2) *ZeroLeverage*	(3) *Cash*
	A. Above-median backlog counties		
*Post*High MovableAssets*	0.037***	-0.220**	-0.040***
	(0.009)	(0.089)	(0.010)
Firm-controls	Yes	Yes	Yes
Firm-fixed effects	Yes	Yes	Yes
Year-fixed effects	Yes	Yes	Yes
Observations	46,116	51,116	46,044
R-squared	0.589	0.649	0.567
	B. Below-median backlog counties		
*Post*High MovableAssets*	0.011	-0.177**	-0.003
	(0.009)	(0.077)	(0.011)
Firm-controls	Yes	Yes	Yes
Firm-fixed effects	Yes	Yes	Yes
Year-fixed effects	Yes	Yes	Yes
Observations	57,628	63,835	57,514
R-squared	0.575	0.635	0.549

Table 8: Pre-reform Trends in Treated and Control Groups

The table reports the average change in *Leverage* (panel A), *ZeroLeverage* (panel B), and *Cash* (panel C) for firms in the treated and control groups going back different years prior to the reform. The treated group is conformed by firms in sectors above the top quartile of the movable assets index; the control group by firms in sectors below the bottom quartile. The first row in each panel reports statistics for the change going back one year prior to the reform. A similar calculation is reported in the second row of the table, but the data goes back two years prior to the reform. Subsequent rows go back further in time at larger increments. The table also reports the differences in means and the p-value associated with a test statistic for the differences. *Leverage* is the ratio of total debt to total assets, *ZeroLeverage* is a dummy equal to one if a firm has zero leverage and zero otherwise, and *Cash* is the ratio of cash holdings to total assets.

Years prior to reform	Treated	Control	Difference	p-value
		A. Change in Leverage		
One	0.006	0.006	0.000	0.945
Two	0.018	0.017	0.001	0.856
Three	0.026	0.029	-0.002	0.771
Four	0.030	0.025	-0.004	0.696
		B. Change in ZeroLeverage		
One	-0.001	-0.002	0.000	0.356
Two	-0.002	-0.004	0.001	0.207
Three	-0.004	-0.005	0.004	0.215
Four	-0.004	-0.009	0.005	0.228
		C. Change in Cash		
One	-0.003	-0.006	0.002	0.697
Two	-0.009	-0.013	0.004	0.617
Three	-0.020	-0.026	0.005	0.523
Four	-0.009	-0.016	0.007	0.607

Table 9: Effect of Collateral Reform: Controlling for Business Cycle

The table presents the results from the following regression:

$$Y_{ist} = \alpha_i + \alpha_t + \beta Post_t * HighMovableAssets_s + \gamma Post_t * HighSensitivity_s + \delta X_{ist} + \epsilon_{ist},$$

where Y is the outcome variable for firm i in sector s in year t. *Post* is a dummy equal to zero before the reform date and one afterwards. $HighMovableAssets_s$ is a dummy equal to one for all sectors above the top quartile of the movable assets index and zero for sectors below the bottom quartile. $HighSensitivity_s$ is a dummy equal to one for all sectors above the top quartile of the business cycle sensitivity sectoral index and zero for sectors below the bottom quartile. X is a vector of firm controls. The specification includes a full set of firm-fixed effects (α_i) and year-fixed effects (α_t). The standard errors are clustered at the firm level. *Leverage* is the ratio of total debt to total assets, *ZeroLeverage* is a dummy equal to one if a firm has zero leverage and zero otherwise, and *Cash* is the ratio of cash holdings to total assets.

	(1) *Leverage*	(2) *ZeroLeverage*	(3) *Cash*
*Post*High MovableAssets*	0.021***	-0.231**	-0.016***
	(0.007)	(0.114)	(0.005)
*Post*High Sensitivity*	0.016***	-0.006	-0.009***
	(0.006)	(0.110)	(0.003)
Size	0.019***	-0.054***	-0.015***
	(0.002)	(0.002)	(0.001)
Age	0.007***	-0.025***	0.012***
	(0.001)	(0.001)	(0.001)
Profitability	-0.060***	0.051***	0.067***
	(0.004)	(0.006)	(0.002)
OverallTangibility	0.020***	-0.114***	-0.054***
	(0.006)	(0.011)	(0.003)
Firm-fixed effects	Yes	Yes	Yes
Year-fixed effects	Yes	Yes	Yes
Observations	95,482	105,633	105,262
R-squared	0.579	0.637	0.619

Table 10: Effect of Collateral Reform: Placebo Tests

We falsely assume that Romania's three neighboring countries (Bulgaria, Hungary, and Ukraine) and its main commercial partner (Italy) implemented a collateral reform in the same year than Romania. For each country, we estimate the following regression:

$$Leverage_{ist} = \alpha_i + \alpha_t + \beta Post_t * HighMovableAssets_s + \gamma X_{ist} + \epsilon_{ist},$$

where *Leverage* is the ratio of total debt to total assets for firm i in sector s in year t. *Post* is a dummy equal to zero before 2000 and one afterwards. $HighMovableAssets_s$ is a dummy equal to one for all sectors above the top quartile of the movable assets index and zero for sectors below the bottom quartile. X is a vector of firm controls. The specification includes a full set of firm-fixed effects (α_i) and year-fixed effects (α_t). The standard errors are clustered at the firm level.

	(1) Bulgaria	(2) Hungary	(3) Ukraine	(4) Italy
*Post*High MovableAssets*	-0.017	-0.015	0.033	0.002
	(0.017)	(0.049)	(0.073)	(0.002)
Firm-controls	Yes	Yes	Yes	Yes
Firm-fixed effects	Yes	Yes	Yes	Yes
Year-fixed effects	Yes	Yes	Yes	Yes
Observations	6,539	4,700	9,859	242,837
R-squared	0.715	0.991	0.814	0.626

Table 11: Effect of Collateral Reform: Matching Estimation

Panel A compares the properties of treated, control, and matched-control firms, regarding the four covariates: *Size*, *Age*, *Profitability*, *OverallTangibility*. The treated firms are those operating in sectors above the top quartile of the movable assets index; control firms are those operating in sectors below the bottom quartile. Panel A.1 reports the median value of each covariate for the treated and control group before matching, the difference of the medians, and the p-value associated with a test statistic for the differences. Panel A.2 reports the same statistics for the treated and control group after matching. Panel B reports the estimates of the effect of the collateral reform on *Leverage*, *ZeroLeverage*, and *Cash*. For ease of reference, the first row reproduces the estimates of the benchmark estimator from Tables 2, 3, 4. The second row reports the average treatment effect of the treated (ATT), after matching the treated and control group according to the four covariates.

A. Median for Treated, Control, and Matched Control Group

	Size	*Age*	*Profitability*	*Tangibility*
A.1 Before Matching				
Treated	10.97	8.00	0.10	0.39
Control	10.90	6.00	0.08	0.37
Difference	0.07	2.00	0.02	0.02
p-value	0.00	0.00	0.00	0.00
A.2 After Matching				
Treated	10.97	8.00	0.10	0.39
Matched-control	10.96	8.00	0.10	0.39
Difference	0.01	0.00	0.00	0.00
p-value	0.42	0.99	0.99	0.68

B. Benchmark and Matching Estimations

	Leverage	*ZeroLeverage*	*Cash*
Benchmark estimator	0.024***	-0.159***	-0.019***
	(0.006)	(0.056)	(0.004)
ATT estimator	0.018***	-0.228***	-0.018***
	(0.002)	(0.072)	(0.002)

Table 12: Effect of Collateral Reform: Dosage Effects

The table presents the results from the following regression:

$$Leverage_{ist} = \alpha_i + \alpha_t + \beta Post_t * HighMovableAssets_s + \gamma X_{ist} + \epsilon_{it},$$

where *Leverage* is the ratio of total debt to total assets for firm i in sector s in year t. *Post* is a dummy equal to zero before the reform date and one afterwards. $HighMovableAssets_s$ is a dummy equal to one for all sectors above the top quartile of the movable assets index and zero for sectors below the bottom quartile (column (1)); equal to one for sectors in the third quartile and zero for sectors below the bottom quartile (column (2)); equal to one for sectors in the third quartile and zero for sectors below the two bottom quartiles (column (3)), and equal to the original sectoral index (column (4)). X is a vector of firm controls. The specification includes a full set of firm-fixed effects (α_i) and year-fixed effects (α_t). The standard errors are clustered at the firm level.

	(1)	(2)	(3)	(4)
*Post*High MovableAssets*$_{Q4-Q1}$	0.024***			
	(0.006)			
*Post*High MovableAssets*$_{Q3-Q1}$		0.015*		
		(0.008)		
*Post*High MovableAssets*$_{Q3-Q2}$			-0.005	
			(0.006)	
*Post*MovableAssets*				0.047**
				(0.022)
Firm-controls	Yes	Yes	Yes	Yes
Firm-fixed effects	Yes	Yes	Yes	Yes
Year-fixed effects	Yes	Yes	Yes	Yes
Observations	103,744	23,214	48,236	64,302
R-squared	0.582	0.612	0.595	0.595

Table 13: Description of Collateral Reforms in Other Eastern European Countries

The table provides a brief description of the collateral laws passed between 1996-2005 in nine additional Eastern European Countries. For the six reforming countries (Bulgaria, Estonia, Hungary, Latvia, Lithuania, Poland) we report the exact name and date of the collateral law, together with a short explanation of the content of the law change. For the three non-reforming countries, we report the existing legal framework for secured transactions throughout the sample period.

Country	Collateral law
Bulgaria	Law on Registered Pledges: 22 September 1996 (effective from 1 April 1997) Allowed non-possesory interests over movables and created register for movables (Central Pledge Registry)
Czech Republic	Unreformed Existing framework governed by sections 152-174 of the Civil Code
Estonia	Law on Commercial Pledge: 5 June 1996 Allowed non-possesory interests over movables and created registry for movables (Commercial Pledge Register)
Hungary	Amendment to the Civil Code: 9 April 1996 Allowed non-possesory interests over movables and created registry for movables (Charges Register)
Latvia	Law on Commercial Pledge: 21 October 1998 (effective from 1 March 1999) Allowed non-possesory interests over movables and created registry for movables (Commercial Pledge Register)
Lithuania	Law on Pledge over Movable Assets: 10 June 1997 Allowed non-possesory interests over movables and created registry for movables (Hypothecary Register)
Poland	Law on Registered Pledge: 6 December 1996 (effective from 1 January 1998) Allowed non-possesory interests over movables and created registry for movables (Pledge Registry)
Russia	Unreformed Existing framework governed by articles 334-358 of Civil Code and by Federal Law On Pledge of 1992
Ukraine	Unreformed Existing framework governed by Civil Code and by Law on Pledge of 1992

Table 14: Effect of Collateral Reform: Cross-country Analysis

The table presents the results from the following regression:

$$Y_{isct} = \alpha_i + \alpha_{ct} + \beta Post_{ct} * HighMovableAssets_s + \gamma X_{isct} + \epsilon_{isct},$$

where Y denotes either *Leverage*, *DebtMaturity*, or *Cash* for firm i in sector s in country c in year t. *Post* is a dummy equal to zero before the reform date and one afterwards for each country. $HighMovableAssets_s$ is a dummy equal to one for all sectors above the top quartile of the movable sectoral index and zero for sectors below the bottom quartile. X is a vector of firm controls. The specification includes a full set of firm-fixed effects (α_i) and country-year-fixed effects (α_{ct}). The standard errors are clustered at the country level. The sample includes the following ten countries: Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Ukraine, and Russia. *Leverage* is the ratio of total debt to total assets, *ZeroLeverage* is a dummy equal to one if a firm has zero leverage and zero otherwise, *Cash* is the ratio of cash holdings to total assets, *Investment* is the ratio between the change in fixed assets plus depreciation and lagged fixed assets; *Employment* is the log of number of employees; *Productivity* is the log of total factor productivity; *Profitability* is the ratio between EBIT and total assets; and *Sales* denotes the log of sales.

	(1) *Leverage*	(2) *ZeroLeverage*	(3) *Cash*	(4) *Investment*	(5) *Employment*	(6) *Productivity*	(7) *Profitability*	(8) *Sales*
*Post*High MovableAssets*	0.041***	-0.180***	-0.007***	0.047***	0.015***	0.076***	0.016	0.061***
	(0.003)	(0.018)	(0.002)	(0.001)	(0.001)	(0.001)	(0.011)	(0.001)
Firm-controls	Yes	Yes	Yes	No	No	No	No	No
Firm-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-year-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	174,774	188,963	187,585	238,017	352,173	352,173	338,510	352,173
R-squared	0.623	0.663	0.678	0.492	0.949	0.819	0.532	0.948