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

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Abstract

Recent reforms across Eastern European countries have given more flexibility and information to parties to engage in secured debt transactions. 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 as a result. Those firms also invested more, hired more, and became more efficient and profitable following the changes in the contracting environment. The financial deepening we document triggered important reallocation effects: firms affected by the reforms increased their share of fixed assets and employment in the economy. (*JEL* G32, K22, O16)

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A large literature has looked at links between creditors' rights and financial development, documenting a positive relationship between creditor protection and the size of credit markets (e.g., La Porta et al. 1997, 1998; Levine 1998, 1999). Notably, existing analyses are often conducted with country-level data, making it difficult to identify how different elements of financial contracting ultimately work in promoting credit expansion. Against the backdrop of this research, credit reforms in emerging economies have focused on the allocation of control rights over assets in liquidation as a way to facilitate contracting. We extend this literature by providing evidence on the micro-level foundations of the connections between the contracting environment and credit expansion.

Theory suggests that access to credit in imperfect capital markets depends on the menu of assets that can be credibly offered as collateral by borrowers (Aghion and Bolton 1992; Hart and Moore 1994). In this paper, we study reforms that emphasize the idea of enlarging the contracting space (larger "collateral menus") available to parties as a way to promote secured credit transactions. We look not only at credit taking by firms, but also at how reform-enabled credit expansion ultimately affects real aspects of economic activity. Recent reform in Romania is considered a textbook example of change that enlarged the menu of assets that can be used as collateral in credit transactions (Fleisig, Safavian, and de la Peña 2006). We thus start our analysis with the Romanian setting as a basis to understand how the reform worked and to analyze the economic responses it triggered. We subsequently generalize our analysis to a broader group of Eastern European countries, some of which witnessed similar legal changes, but at different time points.

Throughout the 1990s, Romania's Commercial Code only allowed for secured transactions involving "immovable assets" (e.g., land and buildings). For practical purposes, "movable assets" (e.g., machinery and equipment) could not be pledged as collateral. Around the world, firms' movable assets comprise about half of their total fixed assets (Alvarez de la Campa 2011); yet in Romania, as well as in other Eastern European countries, firms had a hard time using those assets to secure credit. In light of a legal framework that favored debtors, Romanian firms faced difficulties in financing investment in machinery and equipment through alternatives, such as leasing and unsecured lending with contractual provisions. In 2000, the Romanian government implemented Law 99, which transformed the framework in which debt contracts could be written, giving Romanian firms a new alternative for financing machinery

and equipment.

In essence, Law 99 eliminated the possessory nature of security interests. As an intended consequence, the contracting framework no longer required the physical transfer of movable assets to the creditor and made it possible for firms to give creditors "substitute" assets (e.g., similar assets or cash equivalents) if mutually agreed. It also introduced a uniform electronic system of real-time information on seniority of security interests over movable assets. Law 99 gave lenders much larger latitude in the origination of credit facilities (e.g., varying syndication, subordination, and maturity structure), allowing for more loans to be taken out of a new class of legally pledgeable assets.

From an empirical standpoint, the Romanian setting is unique in identifying the types of assets that could allow for credit expansion under the 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 in their operations. *Immovable* assets, on the other hand, were used as collateral before 2000, and the reform had no bearing on contracts secured by real estate assets. This institutional wrinkle helps us pinpoint the link between collateral menus and access to credit.

To estimate the effects of the collateral-menu-enlarging reform, we take advantage of the fact that some sectors of the economy naturally use more machinery and equipment than do others. We 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 demand for immovable assets, which were not contemplated by the legal reform. We gauge the external validity of our inferences by extrapolating our tests to other Eastern European countries. While these economies are comparable in relevant dimensions, the timing of the collateral reforms was not contemporaneous (or did not happen at all), owing to idiosyncrasies affecting the speed of various political processes.[1] This time variation in the wave of reforms across Eastern Europe allows us to exploit both within-country and

[1]During our 1996–2005 sample period, two other Eastern European countries (Latvia and Poland) enacted collateral reforms that resembled Romania's Law 99. Three other countries (Czech Republic, Ukraine, and Russia) failed to pass any such laws during this period. Finally, four other countries in the region (Bulgaria, Estonia, Hungary, and Lithuania) had already reformed their collateral laws prior to the beginning of our sample period.

cross-country contrasts.

Our base tests show that firms operating in sectors more intensive in overall tangible assets (the sum of movable and immovable assets) 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 sectors intensive in movable assets observe an enhancement in their ability to borrow. We look not only at the amount of debt firms raise, but also at the likelihood firms start using debt in the first place. On this front, albeit statistically weaker, our results point to an expansion of access to credit: firms operating more movable assets are more likely to abandon their previous "zero-leverage" status. We also find that high-movable-assets firms accumulate less cash in their balance sheets. Whether firms operate more or less immovable assets, in contrast, does not have any effect on their use of debt financing nor on their savings policies following the reform.

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, and profitability, a firm operating in the top quartile of the movable assets sectoral distribution observes an increase in its leverage ratio by 3.7 percentage points more than its counterpart in the low movable-assets 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%; a 35% increase relative to the baseline. Using the same comparison, the proportion of zero-leverage firms drops by 32 percentage points more in the high-movable-assets category (or 57% of the sample mean) after the reform. This latter result is statistically weaker for the average firm. As we investigate this effect in more depth, however, we find that it is particularly significant for smaller firms in the economy.

Our analysis goes further in showing how changing the ability to sign secured debt contracts can have far-reaching implications for corporate outcomes across Eastern Europe. Using data from ten countries in the region, we confirm that firms with more movable assets raise more debt and save less cash after collateral-menu-enlarging reforms. We also show that they invest more in fixed assets, which allows for more debt capacity. To gauge the effect of the spur in capital investment, we consider a number of additional outcomes. First, we examine if firms changed their labor demand and find that firms hire more workers. We look at measures of profitability and find that they also increase for firms with more movable assets

following reforms. Finally, we examine if the increase in tangible assets and labor usage leads to changes in productivity. We find that firms with more movable assets observe an increase in total factor productivity. Our findings imply that firms not only 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 economy-wide consequences of collateral reforms, we document important reallocation effects. Sectors that make more intensive use of movable assets witnessed a stark increase in their share of aggregate fixed assets in Romania: from 37% to 52% between the pre- and post-reform periods. These same sectors witnessed a significant increase in their share of employment in the economy, from 31% to 38%. Similar patterns are found for Latvia and Poland, which reformed their legal contracting environment to allow for borrowing against movable assets in 1999 and 1998, respectively.

We subject our results to a long battery of checks. Among others, we falsify our experiment by testing for the introduction of "placebo reforms" in 2000 in the countries that share borders with Romania (Bulgaria, Hungary, and Ukraine), as well as Romania's largest trading partner (Italy). None of these countries passed such reforms in or round 2000, yet one could worry that underlying economic, geopolitical, or technological factors may have allowed firms in some movable-intensive sectors to gain more access to debt starting in 2000. We find no significant changes in the credit capacity of firms with movable assets in these placebo countries. As we detail below, our analysis also considers sectoral dynamics (e.g., sensitivity to business cycle) and utilizes alternative econometric methods (e.g., matching estimation) to ensure the robustness of our results.

Because of data limitations, we are not able to fully observe the extent to which movable assets were used to secure credit through other alternatives, such as leasing prior to a collateral reform. However, our experimental design shows strong evidence that firms operating more movable assets borrowed more and invested more as a result of a reform that altered the terms of standard secured lending. Simply put, we show that allowing firms to collateralize machinery and equipment enlarged the debt contracting space, with positive consequences for access to credit and real economic activity.

Only a small literature has analyzed the impact of sudden changes in the contracting environment using detailed, country-specific firm data as we do here. Lilienfeld-Toal, Mookherjee, and Visaria (2012) and Vig (2013) look at reforms in India that empowered creditors in seiz-

ing assets of defaulting firms. They find that strengthening enforceability led to a decline in borrowing, especially for smaller firms, which is arguably a counterproductive outcome from a policy perspective. Assunção, Benmelech, and Silva (2013) study a reform in Brazil that simplified the sale of repossessed cars used as collateral for auto loans. The authors find that the change led to more lending, eventually allowing for riskier borrowers to obtain loans for more expensive cars. Looking at the reform of Napoleonic Code-based security laws in France, Aretz, Campello, and Marchica (2015) find that capital-intensive, small, start-up firms located in rural areas increased their borrowing with value-enhancing effects at both the micro- and macroeconomic levels. These studies highlight the difficulties policy makers face in predicting the outcomes of credit reforms.

Our paper is closer in spirit to Haselmann, Pistor, and Vig (2009), who study both bankruptcy and collateral reforms in Eastern Europe and find that such legal reforms led to more lending. Our paper extends their work by identifying some of the mechanisms through which collateral reforms led to higher firm borrowing. As Eastern European reforms expanded the collateral menu to include movable assets, we exploit within-country variation in asset-type utilization intensity around the reforms to identify that firms operating more movable assets borrowed more. Moreover, we show that beyond increasing credit, collateral reforms ultimately triggered changes in firm-level real-side outcomes. Our paper also relates to Calomiris et al. (2015), who document that loan-to-values of loans collateralized with movable assets are lower in countries with weak collateral laws. Our paper complements their work by analyzing the problem from the point of view of the firms, instead of creditors, and by looking into within-country law changes, rather than comparing laws across countries.

Our paper also adds to the literature that looks at the impact of collateral on leverage ratios. Among recent studies, the emphasis has been on variations in the value (Gan 2007), quantity supplied (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 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.[2]

1. Institutional Setting

Research from the World Bank points to Romania as a textbook example of a country enacting changes that significantly enhanced the law of secured transactions (Fleisig, Safavian, and de la Peña 2006). In this section, we start by describing Romania's reform. We then discuss collateral reforms across a broader group of Eastern European countries.

1.1 Collateral reform in Romania

Firms operating in well-developed credit markets typically face three alternatives for financing investment in machinery and equipment. The first alternative is secured lending. The firm obtains a loan from the creditor and purchases the equipment, pledging it as collateral in a legally binding contract. The creditor has a "security interest" — not ownership — over the equipment, which it can enforce in the event of default. The second alternative is leasing. The leasing contract guarantees the use of the equipment in exchange for regular payments from the lessee (firm) to the lessor (creditor).[3] One advantage of leasing is that ownership still lies with the lessor, which allows for faster recovery in default. At the same time, moral hazard problems often arise from the separation of ownership and control. The third alternative is unsecured lending, with contractual provisions that indirectly try to make sure that the liquidation value of the equipment accrues to the creditor (e.g., a combination of asset sales restrictions and antilayering provisions).

Prior to 2000, Romania lacked a legal framework that allowed firms and creditors to write secured loan contracts over machinery and equipment. Specifically, two major codes governed secured transactions in Romania at the time: the Civil Code and the Commercial Code.[4] Under codified law, a creditor could secure a loan by creating a security interest over immovable assets ("mortgage") and over movable assets ("pledges"). Critically, however,

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

[3]Evidence suggests that unconstrained firms prefer to finance their machinery and equipment investment via secured lending as opposed to leasing (Eisfeldt and Rampini 2009).

[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.

pledges took the form of possessory interests. This meant that the law did not allow parties to establish security interests over movable assets without transferring actual possession to the creditor. In practical terms, a firm could not pledge a piece of equipment to a third party and still physically control it (keep it under its roof). In other words, the firm could not write a standard secured loan contract with a bank. In principle, firms could still finance machinery and equipment investment through leasing or unsecured credit. However, as explained above, in light of a legal framework that favored debtors, the market for leasing was bleak at that time.[5] The country's adherence to the traditional (French-style) pledge system made it difficult for firms to use a host of its productive assets as collateral in standard debt contracts. As we explain below, the 2000 reform allowed nonpossessory secured lending over movable assets, giving Romanian firms a new alternative for financing machinery and equipment.

Throughout the 1990s, the European Bank of Reconstruction and Development (EBRD) advocated 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 over movable assets. Shortly thereafter, 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 United States' 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.

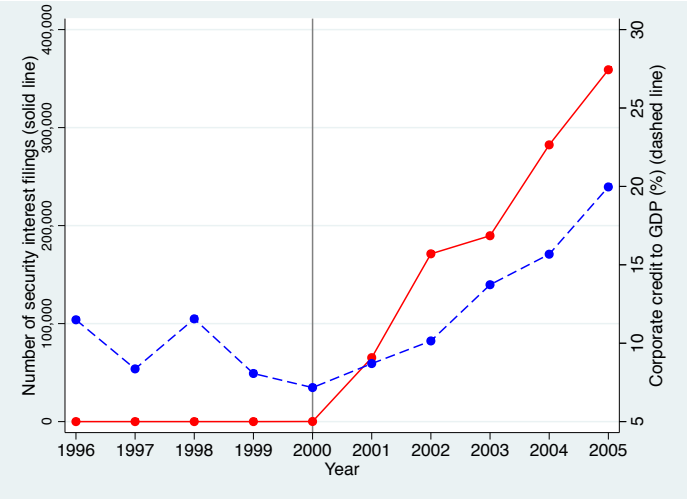
Romania's Law 99 vastly expanded the range of assets that could serve as collateral. It introduced a broad system of security interests and derogated the old pledge regime. Importantly, the law allowed parties to establish security interests over movable assets without having to transfer possession of the asset to the creditor. The law also introduced the "Electronic Archive of Security Interests in Personal Property," a fully automated system of registration of security interests over movable assets that instantaneously files into a database notices that a security interest has been taken over a movable asset.[6] The law further awarded creditors

[5] In 1999, Romania's leasing market for machinery and equipment in terms of concluded contracts represented only 0.02% of GDP (cf. Association of Leasing Companies of Romania). The comparable number for the United States is at least five times higher (cf. Equipment Leasing and Finance Association).

[6] Romania's registration system was the world's most advanced at its inception, being the first to accept fillings over the internet. Love, Martinez Peria, and Sandeep (2015) study the effects of the introduction of collateral registries across a large number of countries.

Figure 1
Evolution of security interest filings and corporate credit in Romania

This 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.



legal powers to repossess collateral in the event of default without court intervention, as long as a breach of the peace did not occur.

Figure 1 plots the time evolution of the number of filings into the Electronic Archive (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 and rose to 360,000 filings by 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, and 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 firms 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 nearly tripled between 2000 and 2005, rising from 7% to 20%.

1.2 Collateral reform in other Eastern European countries

We extend our study to a cross-country analysis by collecting information on collateral laws for nine additional Eastern European economies. While these economies are comparable on a number of dimensions–they inherent much of the same legacy of centralized, socialist-oriented, large manufacturing base–the passage of collateral reforms was not contemporaneous, owing to various idiosyncrasies. Table 1 reports the relevant details of the collateral reforms observed in the countries in the region during our sample period 1996–2005. Four of the countries had reformed their collateral legal frameworks by 1996, the first year of our sample period: Bulgaria, Estonia, Hungary, and Lithuania. Two other countries reformed in the middle of our sample period: Latvia passed the "Law on Commercial Pledge" in 1998 (effective in 1999), and Poland passed the "Law on Registered Pledge" in 1996 (effective in 1998). The reforms in Latvia and Poland were similar to the reform passed in Romania: they allowed parties to establish security interests over movable assets without having to transfer possession to the creditor, and they created a collateral registry to register such security interests. Three remaining countries did not implement reforms over the time period we study: Czech Republic, Ukraine, and Russia.

TABLE 1 ABOUT HERE

In conducting our tests under a treatment effects framework, we generalize our findings by integrating and comparing outcomes for firms operating in these different sets of countries.

2. Data and Empirical Strategy

2.1 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. Amadeus collects data from local information providers, which in most cases are the local registries. In Romania, 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, Amadeus's data coverage of Amadeus of Romania, covering the majority of privately held firms in the country, is particularly comprehensive.

The filing requirements for other Eastern European countries are less strict, leading to less comprehensive coverage.

Our basic outcome variable is leverage, which should be plausibly affected by changes in the menu of assets firms are able to offer as collateral for debt taking. We measure *Leverage* as the ratio between total debt and the book value of assets. We define *ZeroLeverage* as a dummy variable equal to one if a firm has no leverage and zero otherwise. We also glean additional insights into firms' borrowing by looking at their savings behavior; in particular, their need to carry cash balances. We define *Cash* as 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; Lemmon, Roberts, and Zender 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 (i.e., property, plant, and equipment) to total assets.

We also study the effect of collateral reforms on a set of real-side corporate outcomes. *Investment* is the change in fixed assets 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] and *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.

Table 2 reports summary statistics of *Leverage*, *ZeroLeverage*, and *Cash* for each of the ten countries in the sample during the 1996–2005 period. The mean value of *Leverage* in Romania is 10.5%. Average leverage varies across the region, ranging from 4.4% in Russia to 18.9% in Latvia. The fraction of zero-leverage firms also varies across countries. In Romania, on average, 57% of the firms in the sample are financed entirely with equity. The country with the highest fraction of zero-leverage firms is Russia (73%), and the country with the lowest fraction of zero-leverage firms is Latvia (13%). Firms in Romania hold, on average, 7.9% of their assets in cash. The average cash ratio ranges from 2.6% in Ukraine to 15.9% in

[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 (2015) for details.

Estonia. The average firm in the sample is young and small, consistent with private sector enterprises in transition economies. For example, the average Romanian sample firm is seven years old, has total assets worth $1.8 million (in 2000 U.S. dollars), and hires 65 employees.

TABLE 2 ABOUT HERE

2.2 Test strategy

Because a collateral reform allows firms to pledge movable assets as collateral, it should particularly benefit firms operating in sectors that make intensive use of assets such as machinery and equipment. To identify the effect of a reform, we take advantage of the fact that some sectors are inherently more intensive than others in their demand for machinery and equipment.

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 reform. To do so, we rank manufacturers according to a movable assets demand index (explained shortly). We then assign those firms operating in sectors at the high end of the sectoral ranking to a "treatment group." The "control group" consists of firms at 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.

2.3 Sectoral asset indices

In a legal framework in which 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 the reform, 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 firms whose use of movable assets are unconstrained by the severe legal frictions in place before the reform.

2.3.1 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 United States more closely utilize a desired mix of assets in their production processes. We assume that such an asset mix is driven by sector-specific characteristics and that different sectors may make more- or less-intensive use of movable assets due to the nature of their output (governed by production and technological parameters). The asset mix characteristic that matters the most for our analysis has to do with asset tangibility. Along that dimension, a regular firm operates both fixed assets and other assets. To ease exposition, we divide a firm's assets accordingly as follows:

$$Total\ assets = Fixed\ assets + Other\ assets. \tag{1}$$

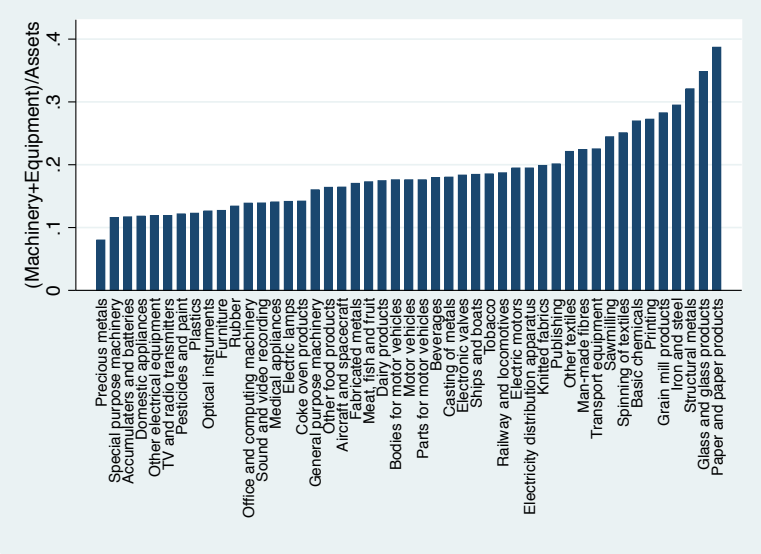
The first category encompasses assets such as machinery, equipment, land, and buildings. The second includes assets such as cash and receivables. Notably, the collateral reform allowed firms to pledge movable fixed assets such as machinery and equipment. The reform, however, did not alter the pledgeability of immovable fixed assets such as land and buildings, which were already pledgeable. The unique manner in which the reform affected 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 manufacturers from the United States 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 movable assets-to-total assets ratio of the firms operating in that sector. We do the same calculation for the land and buildings-to-total assets ratio, thus computing an immovable assets index. Likewise, we use the fixed assets-to-total assets ratio to compute an overall

Figure 2
Sectoral index of movable assets intensity

This 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 United States in each sector for the period 1984-1996. The figure is sorted in ascending order with respect to movable assets intensity.



tangibility index. Overall tangibility equals 34% of total assets, on average. Movable assets, in turn, represent 54% of the ratio between fixed assets and total assets. The correlation between the movable and immovable assets indices is positive- but low (only 0.3).

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

As we take our tests to other economies in Eastern Europe, we study the relative size of movable-intensive sectors in the countries in our sample. We find that the fraction of aggregate fixed assets allocated to sectors above the top quartile of the movable assets index in each sample country is as follows: Bulgaria 53%, Czech Republic 40%, Estonia 51%, Hungary

38%, Latvia 40%, Lithuania 46%, Poland 38%, Romania 40%, Russia 49%, and Ukraine 46%. The relatively narrow band in which these fractions are distributed may be unsurprising given that our sample countries operated as central planned economies for several decades leading up to the time period we study.

2.3.2 Index utilization. Our approach does not require that the value of the index in each sector is the same in the United States and Eastern Europe. The approach only assumes that the sectoral ranking of demand for movable assets is sensibly similar.[8] For example, the manufacture of paper products demands an intense use of large mills (heavy machinery and equipment), regardless of whether the factory is operated in the United States, Western Europe, or Eastern Europe. On the other hand, precious metal production is relatively less dependent on machinery, with most hard assets associated with the plant, again independent of the country in which firm operates. As we restrict our attention to traditional manufacturing activities in countries with sizable industrial sectors, our working hypothesis appears to be plausible.

Because 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 U.S. 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 belief 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, converging to the asset mix observed in the United States or other credit-unconstrained economies.

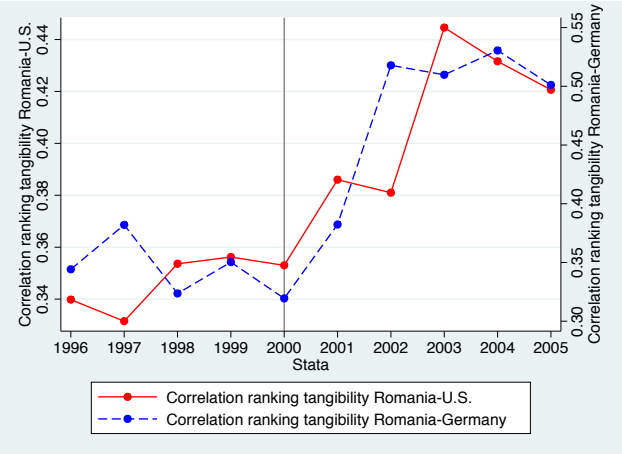
To check this conjecture, for each year between 1996 and 2005, we calculate the sectoral overall tangibility index using Romanian data, as well as data from the United States and Germany. In Figure 3, we plot the evolution of the correlation coefficient between the Romanian- and U.S.-based sectoral rankings of overall tangibility. Prior to the 2000 reform, the correlation between both rankings is quite stable, hovering around a value of 0.35. After the reform, the correlation increases steadily, and by 2005 it is equal to 0.42. In the same figure, we plot the correlation between the Romanian- and German-based rankings of overall tangibility.[9]

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

[9] The German-based overall tangibility index is calculated using data from Amadeus.

Figure 3
Evolution of correlation between Romania-, U.S.-, and German-based rankings of sectoral overall tangibility

This figure plots the evolution of the coefficient of correlation between the Romania- and U.S.-based, and Romania- and German-based, rankings of sectoral overall tangibility index. The U.S.- and German-based tangibility indices are calculated using 1996 data. The Romania-based tangibility index is calculated for each year between 1996–2005. Overall asset tangibility for each sector is defined as the median of the ratio between fixed assets and total assets across all firms operating in that sector.



The correlation between the Romanian- and German-based rankings exhibits a very similar behavior. The correlation is stable prior to 2000, after which time it starts to steadily increase. Figure 3 suggests that prior to the reform, firms in Romania displayed tangible-to-total asset ratios that were quite different than those of comparable, credit-unconstrained firms based in either the United States or Germany. Following the collateral reform, Romanian firms' asset mix started to more closely resemble the asset mix of foreign-based benchmark firms.

3. Credit Expansion

3.1 The baseline empirical model

We start by estimating the following difference-in-differences specification to gauge the effect of a collateral reform on firm financing:

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

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 and one afterward.

HighMovableAssets is a dummy that equals one if the firm belongs to the treated group (sectors in the top quartile of the movable assets sectoral index) and zero if the firm belongs to the control group (sectors in the bottom quartile of the index).[10] X_{ist} denotes a vector of firm-level controls that includes *Size*, *Age*, *Profitability*, and *OverallTangibility*. 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. ϵ_{ist} is the error term, with standard errors clustered at the firm level.[11] The coefficient of interest is β, which 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 baseline test is that there could be a concurrent credit supply shock at the time of the reform affecting all tangible assets, both movables and immovables. Because immovable assets were allowed to be pledged before and after the reform, we address this concern by adding an interaction term to Equation (3) between *Post* and a dummy that equals one (zero) if the firm belongs to a sector in the top (bottom) quartile of the immovable assets sectoral index. We denote this variable as *HighImmovableAssets*.

3.2 Parallel trends

Our difference-in-differences strategy assumes that, in absence of the reform, the change in the outcome variables of interest would have been the same for firms in the treated and control groups. Accordingly, it is important to check whether trends in the outcome variables for both groups were similar ("parallel") prior to the reform in Romania. We do so looking at the evolution of changes in leverage ratios, the fraction of zero-leverage firms, and cash holdings before the reform. Panel A of Table 3 reports the results for *Leverage*. The difference between the change in leverage for the treated and control groups is not statistically different

[10] In Section 5, we compare the effects across different quartiles of the movable assets distribution. We also show that the results are robust to using the original (continuous) version of the index.

[11] 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, Duflo, and Mullainathan 2004).

from zero. This holds for all pre-reform horizons we consider, going back all the way to the beginning of our sample period. Panels B and C show similar patterns for *ZeroLeverage* and *Cash* for the two comparison groups. In all, there are no discernible differences in trends for either debt or cash ratios for our sample firms in the high- and low-movable-assets categories before the collateral reform.

TABLE 3 ABOUT HERE

3.3 Leverage ratios in Romania

Table 4 reports the results for *Leverage* in Romania. 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 because not all types of fixed assets were affected by the reform. Accordingly, we break the overall tangibility effect into its different components. In particular, because the collateral reform only boosted 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 firms' leverage in movable-intensive sectors by 2.4 percentage points more than in sectors in which firms operate fewer movable assets. That is, for firms of the same size, age, profitability, and even overall tangibility, those that operate in sectors that have a higher use of movable assets observe a markedly higher use of debt financing following the collateral reform. In Column (3), we include the interactions between the *Post* dummy and both the movable-assets and immovable-assets indicators.[12] The results confirm that the effects are only observed for firms operating in sectors intensive in movable assets. The reform increased leverage of firms in movable-intensive sectors by 3.7 percentage points more than in firms in nonintensive sectors. The effect is highly significant and of sizable

[12]The number of observations decreases when we control for both indicators. The movable-assets dummy is equal to one for sectors at the top quartile of the movable ranking and zero for sectors at the bottom quartile. The estimation in Column (2) thus excludes all sectors in the two middle quartiles of the movable assets ranking. When we also control for the immovable-assets dummy in Column (3), we exclude sectors in the middle quartiles of both sectoral indices. Because the excluded sectors are not the same, there are fewer observations under Column (3).

magnitude: it amounts to 35% of the average sample leverage (= 3.7%/10.5%).

TABLE 4 ABOUT HERE

It is important that we examine the dynamic effect of the Romanian reform on firm leverage. To trace out the year-by-year effects of the reform, we estimate a variant of Equation (3):[13]

$$Leverage_{ist} = \alpha_i + \alpha_t + \sum_{\tau=-4}^{5} \beta_\tau D_\tau * HighMovableAssets_s + \gamma X_{ist} + \epsilon_{ist}, \quad (4)$$

where the reform dummy variables equal zero, except as follows: $D^{-\tau}$ equals one in the τth year before the reform, and $D^{+\tau}$ equals one in the τth year after the reform. We exclude the reform year, and therefore estimate the dynamic effect of the reform on leverage relative to the year of reform.[14] Figure 4 plots the coefficient estimates and the 95% confidence intervals, which are adjusted for firm-level clustering. The β_τ estimates show no effects in the four years before the reform was passed. After the reform, the effect on leverage materializes rather quickly. The dynamic estimates provide evidence that the collateral reform progressively led to higher leverage ratios for firms operating more movable assets in a sensible fashion.

3.4 Leverage ratios across Eastern Europe

After analyzing the reform in Romania, we extend the analysis to the full sample of countries and estimate the cross-country version of Equation (3):

$$Y_{isct} = \alpha_i + \alpha_{ct} + \beta Post_{ct} * HighMovableAssets_s + \gamma X_{isct} + \epsilon_{isct}, \quad (5)$$

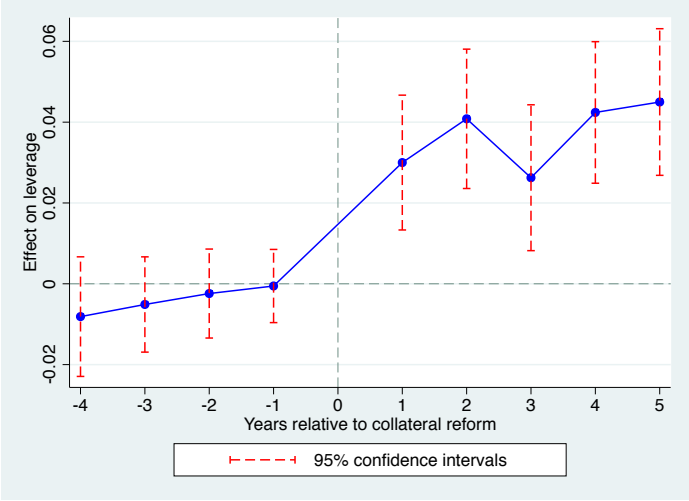
where Y_{isct} denotes the outcome variable of interest for firm i in sector s in country c in year t. $Post_{ct}$ is a dummy that equals zero before the reform year and one afterward in each country. The specification includes a full set of firm fixed effects (α_i) and country-year fixed effects (α_{ct}). The main advantage of this specification over the one in Equation (3) is the inclusion of country-year fixed effects. The country-year fixed effects control for all country-level, time-varying shocks. Because we control for country-year fixed effects, the coefficient β

[13] We thank a referee for suggesting this test to more fully describe the effects of the reform.

[14] The estimation follows the specification in Column (3) of Table 4 and therefore controls for the interaction between the post-reform and immovable-assets dummies.

Figure 4
Dynamic effect of collateral reform on leverage in Romania

This figure plots the dynamic impact of the collateral reform in Romania on leverage. In particular, the figure plots the coefficient estimates of Equation (4). We exclude the year of the reform, thus estimating the dynamic effect of the reform relative to that year. The dashed lines denote 95% confidence intervals, where standard errors have been clustered at the firm level.



is identified from the within-country variation in movable asset intensity across sectors. The standard errors are clustered conservatively at the country level.[15]

We report the results for *Leverage* in Table 5. As before, we first estimate the effect of the collateral reform across sectors with different intensities in overall asset tangibility. Column (1) shows that collateral reforms, on average, increased leverage for firms in high-overall-tangibility sectors by 3.6 percentage points more than in firms in low-tangibility sectors. When we break the overall tangibility effect into its different components, we again find that the effect is working entirely through the movable-assets component. According to Column (2), the typical collateral reform increased leverage in firms operating in movable-intensive sectors by 4.1 percentage points more than in firms in nonintensive sectors. From Column (3), we also observe that the immovable assets coefficient is not statistically different from zero, but the movable coefficient becomes slightly larger (the effect is 4.7 percentage points).

[15]Haselmann, Pistor, and Vig (2009) study the effects of bankruptcy and collateral reforms on bank lending and firm leverage in a similar sample of Eastern European countries. In Table 11 of their paper, the authors report higher leverage ratios following those reforms exploiting variation in the timing of the reforms across countries. Our identification strategies differ in that we exploit within-country variation in movable assets intensity across sectors, which allows new insights on the mechanism through which collateral reforms affect leverage.

In all, the results we obtain when analyzing the entire Eastern European region resemble those of the more focused Romanian data analysis.

TABLE 5 ABOUT HERE

3.5 Propensity to access credit

The evidence above shows that firms operating more movable assets carry more debt in their balance sheets after a 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 resort to this type of financing after the reform. To gauge this effect, we re-estimate Equation (3) using a dummy that equals one if the firm has no debt in its balance sheet and zero otherwise (*ZeroLeverage*) as dependent variable. Because the dependent variable is binary, we estimate a linear probability model.[16] Columns (1) and (2) of Table 6 report the results for Romania, and columns (3) and (4) report the results for the full sample of ten countries.

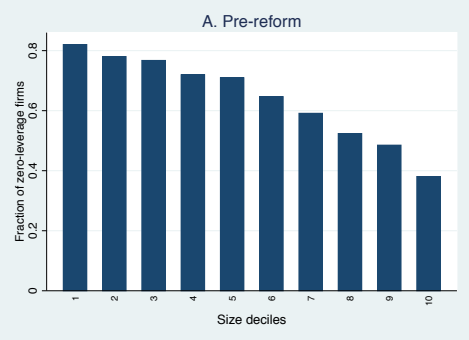
The results in Table 6 suggest that a collateral reform reduced the probability of a firm having zero leverage in the movable-intensive sectors (see Column 1). In Column (2), we control for the interaction between the post-reform dummy and the immovable-assets dummy. The coefficient on the movable dummy remains negative and becomes twice as large in magnitude: the probability of a firm having zero leverage in movable-intensive sectors decreased by 32.4 percentage points more than in nonintensive sectors. This is a sizable magnitude, accounting for 57% of the average fraction of firms with no leverage in the sample (= 32.4%/57.2%). The effect is estimated less precisely, nonetheless, suggesting that we should examine more closely the sample variance of this effect. We conjecture that this could be reflecting an heterogenous effect of the reform on firms. This is a particularly important examination because it allows us to gauge the distributional effects of the reform. These types of distributional effects are often a relevant metric with which policy makers evaluate reforms.

TABLE 6 ABOUT HERE

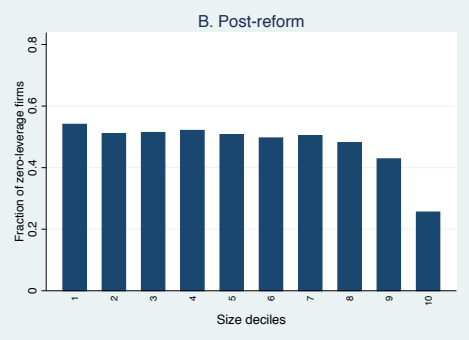
[16] We estimate a linear model instead of a probit model, because fixed effects typically cannot be added to a probit model without inducing bias in the coefficients and standard errors.

Figure 5
Distribution of zero-leverage firms before and after the collateral reform in Romania

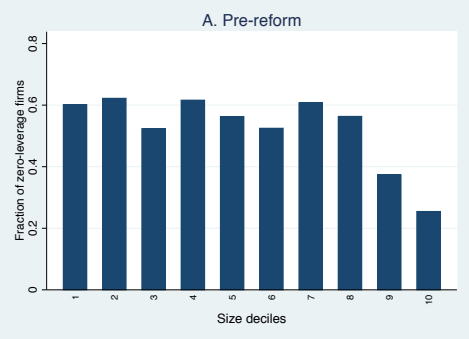
This figure reports the distribution of the fraction of zero-leverage firms in Romania. Firms are divided into deciles according to size, where size is measured as number of employees. Panels A and B report the distribution for sectors intensive in movable assets, over the pre- and post-reform periods, 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.



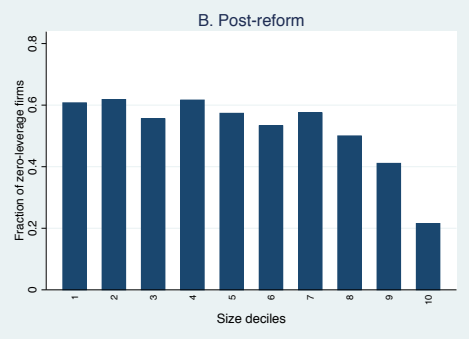
A. Movable-intensive sectors



B. Movable-intensive sectors



C. Non-movable-intensive sectors



D. Non-movable-intensive sectors

To explore this dimension, we divide Romanian firms in movable-intensive sectors into deciles according to size. 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 smaller size bins had no debt in their balance sheets. This fraction declines as we move toward 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 that are not in-

tensive in movable assets. The panels confirm that the effects of the reform are only present in sectors that intensively use movable assets. Notably, the contrast of zero-leverage firms across high- and low-movable-assets sectors disappears with the reform (compare panels B and D).

Columns (3) and (4) of Table 6 reports the zero-leverage results for our complete set of Eastern European countries. In this case, even after controlling for the immovable-assets dummy, we observe a significant effect of the reform on firms operating in movable-intensive sectors. Collateral reforms introduced in Eastern Europe, on average, reduced the probability of a firm having zero leverage in movable-intensive sectors by 21% more than in nonintensive sectors (Column 4).

3.6 Cash savings

Intuition suggests that firms with an enlarged capacity to borrow need to carry less cash in their balance sheets, because carrying cash is expensive if firms have easy access to credit (Acharya, Almeida, and Campello 2007). We study the effect of a collateral 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 common endogeneity concerns in our standard leverage tests.

We report the results for regressions featuring the ratio of cash to assets as the dependent variable (*Cash*) in Table 7. Columns (1) and (2) report the results for Romania. According to the estimates, the reform reduced cash holdings of firms operating in movable-intensive sectors by 1.9 percentage points more than of firms not making intensive use of those assets (Column 1). The effect becomes larger (2.6 percentage points) after controlling for the immovable-assets dummy (Column 2). This is a sizable effect, accounting to 33% of the average cash-to-asset ratio in the sample (= 2.6%/7.9%). Columns (3) and (4) report the results for the full sample of Eastern European countries. The results are in line with what we observe for Romania. In all, our estimates imply that better contracting terms for movable assets seem to make these assets more liquid and firms responded by moving away from hoarding cash.

TABLE 7 ABOUT HERE

4. Real Economic Activity

4.1 Real effects of access to credit

Having established that collateral reforms 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 the literature and highlights the policy relevance of our findings. To conserve space, we focus our analysis on the full sample of Eastern European countries.[17] We estimate the cross-country specification in Equation (5) for each real outcome of interest.

Table 8 reports the results. From this table onwards, we report results returned from the specification that controls for both the movable-assets and immovable-assets indicators. Column (1) of Table 8 shows that collateral reforms in Eastern Europe, on average, increased the investment rate in fixed assets in firms operating in sectors intensive in movable assets by 3.8 percentage points more than in sectors that do not demand those assets. The magnitude of the effect is sizable, amounting to more than 60% of the average sample investment rate (= 3.8%/6.3%). The results in Column (2) suggest that after a collateral reform, firms in movable-intensive sectors hired 2.6% more workers. According to Column (3), the productivity of firms in sectors with high movable assets usage increased by 3.4 percentage points. Column (4) shows that profitability also increased by 3.4 percentage points. Finally, Column (5) shows that sales increased by 2.6 percentage points more in sectors intensive in movable assets. For all these variables, the effect is uniform (i.e., indistinguishable) across sectors with different immovable-assets intensities.

TABLE 8 ABOUT HERE

The fact that firms invested more in fixed assets following collateral reforms is notable and consistent with a "credit multiplier" effect that has been long emphasized in the literature (e.g., Bernanke, Gertler, and Gilchrist 2000).[18] To wit, we have shown in Tables 4 through 6 that following those reforms, firms in sectors intensive in movable assets borrowed more. Results in Table 8 suggest that this extra borrowing was partly used to finance the acqui-

[17] The effects for Romania are similar and omitted for brevity.

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

sition of fixed assets, including machinery and equipment. This further increased the debt capacity of these firms, because they could then pledge their new machinery 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 8. One possibility is that firms were changing the composition of their assets towards a more efficient mix as they became less credit constrained. The previous results on cash holdings are consistent with this explanation. Firms responded to the reform by shifting away from liquid, idle assets toward more illiquid, productive assets.

4.2 Industrial composition effects

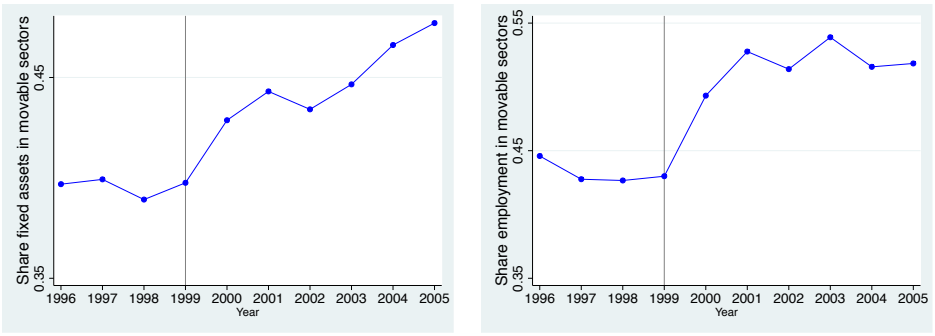
By allowing movable assets to be pledgeable, a collateral reform could trigger a factor reallocation process, changing the industrial composition toward sectors intensive in movable assets. The results in Table 8 suggest this effect works at the firm level. The results from the table also indicate that 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 allocated to sectors intensive in movable assets in the three countries that reformed during our sample period: Latvia, Poland, and Romania. In Figure 6, we plot the evolution of these shares from 1996–2005 in each of the three countries. According to panel A, before the 1999 reform in Latvia, roughly 40% of total fixed assets in the economy were used in movable-intensive sectors. After the reform, this share increased, reaching nearly 48% by 2005. Panels B and C show more pronounced increases for Poland and Romania, respectively. In those countries, the share of fixed capital attributable to movable-intensive sectors was below the 40% mark before the collateral reforms, jumping to well over 50% just a few years after. We also compute the share of aggregate employment in movable-intensive sectors for Latvia, Poland, and Romania around their respective collateral reforms. For these aggregates, too, we see pronounced increases following the reform dates. In Romania, for example, the employment share of the reform-affected sectors increased from 30% in 1996 to almost 40% in 2005.

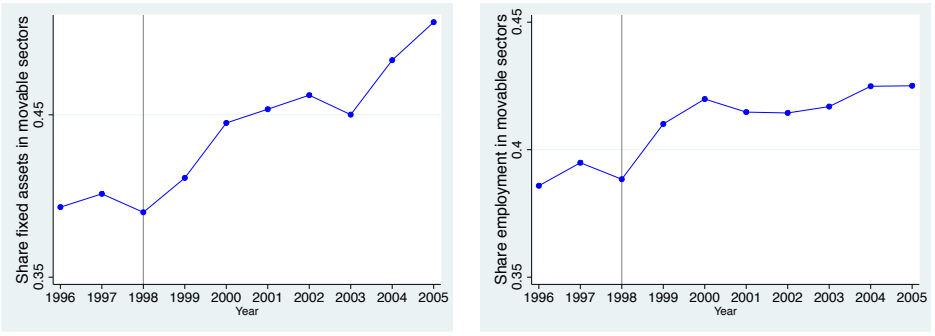
In all, the collateral reforms led to a fast and pronounced sectoral change in those countries' industrial structure and asset utilization mix, with implications for the profile of the

Figure 6
Share of fixed assets and employment in movable-intensive sectors

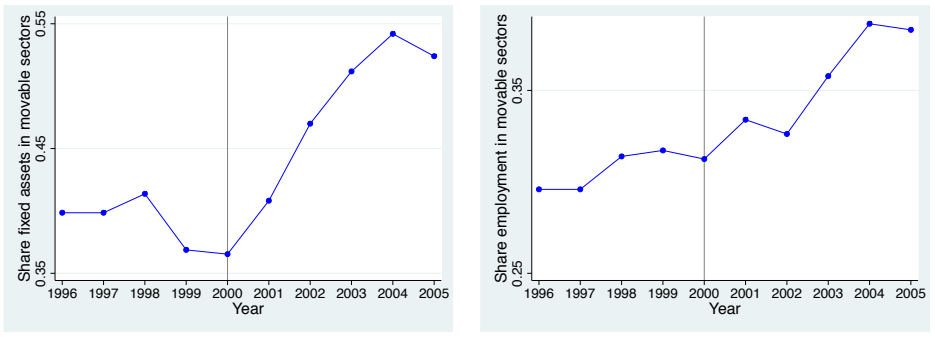
This figure plots the evolution of the share of aggregate fixed assets and the share of aggregate employment allocated to sectors intensive in movable assets during 1996–2005 in Latvia (panel A), Poland (panel B), and Romania (panel C). Movable-intensive sectors are defined as those above the top quartile of the movable assets sectoral index. The vertical gray lines depict the collateral reform dates of each country (Latvia: 1999; Poland: 1998; Romania: 2000).



A. Latvia



B. Poland



C. Romania

industrial workforce.

5. Validity and Robustness Checks

While attractive for identification purposes, difference-in-differences test strategies call for checks on several dimensions. We conduct multiple tests designed to check the validity and robustness of our results. Our test strategy is designed with a focus on the Romanian institutional setting, and we report checks that use Romanian data.

5.1 Confounding effects

One concern with our difference-in-differences strategy is that there could have been alternative, concurrent sectoral shocks causing users of movable assets to demand more credit after 2000. We tackle this concern by conducting a placebo test and controlling for business-cycle sensitivity.

5.1.1 Placebo test. To rule out the alternative story of sectoral shocks specific to movable-intensive sectors, we conduct a placebo test looking at countries likely exposed to similar sectoral shocks. Our premise is that sectoral shocks that could confound our results would affect not only Romania, but also its neighbors and commercial partners. Our experiment falsely assumes that the three neighbors of Romania, for which we have data (Bulgaria, Hungary, and Ukraine), and Italy, Romania's main commercial partner, passed collateral reforms the same year than Romania.[19]

We start by verifying 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. Next, we re-estimate Equation (3) separately for each of the four countries. Table 9 reports the results. Each estimation shows that there is no effect on the credit capacity of firms operating in high-movable-assets sectors. Because we only observe a 2000-specific effect in Romania, the results from Table 9 suggest that our results are not driven by sectoral shocks affecting firms in movable-intensive sectors at this time.

Table 9 About Here

[19]Italy amounts to 20% of Romania's total exports and 23% of its total imports during our sample period.

5.1.2 Sensitivity to the business cycle. A related threat to identification is that different sectors react differently to the business cycle. Romania experienced 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 sectors intensive in movable assets are also more sensitive to business-cycle movements. This would mean that even in the absence of the reform, leverage could increase in movable-intensive sectors as a result of higher credit demand. To rule out this possibility, we introduce an index of sectoral business-cycle sensitivity in our analysis. Using data from the United Nations Industrial Development Organization (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 business-cycle sensitivity index is only 0.17, meaning it is unlikely that our results are driven by a differential response to the business cycle. To formally rule out this alternative, nonetheless, 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 Equation (3) adding an interaction term between the post-reform dummy and the business-cycle sensitivity dummy. The results are reported in Table 10. The effect of the reform on *Leverage*, *ZeroLeverage*, and *Cash* in sectors with different movable assets intensities remains similar in magnitude to our benchmark estimates. These results suggest that our main estimates are not confounded by economic movements that may affect sectors differentially.

TABLE 10 ABOUT HERE

5.2 Dosage effects

Throughout the analysis, we have defined the treatment group as 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 consider the "dosage effects" of collateral reform, comparing outcomes across different quartiles of the movable assets sectoral distribution. If our test strategy is sound, we would expect differences in outcomes to be larger (smaller) the farther (closer) the distance is between treatment and control groups in the movable assets distribution. In this

[20] UNIDO's database is used in several cross-country, cross-sector studies like ours (e.g., Rajan and Zingales 1998). UNIDO's Industrial Statistics Database (INDSTAT) provides industrial indicators for 127 countries from 1990 to 2010, covering the universe of firms operating in each sector in each country.

exercise, we first classify those sectors in the third quartile as treated and those sectors in the bottom quartile of the movable assets index distribution as the control. We then classify the sectors in the third quartile as treated and the sectors below the second quartile as the control. Finally, to fully exploit the information in the movable assets distribution, we use the original (continuous) movable assets index instead of the binary version.

Table 11 reports the results. For ease of comparison, Column (1) redisplays the results for our benchmark treated-control classification (top versus bottom quartiles). Column (2) reports the results for the first alternative classification, where we compare firms in the third and first quartiles of the movable assets 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 become gradually smaller in a sensible fashion. 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 0.042). This means that our results about the impact of the reform are robust to how we treat the movable assets index for testing.

TABLE 11 ABOUT HERE

5.3 Matching estimations

Another potential concern with the difference-in-differences estimation is that firms in movable-intensive and nonintensive sectors may be too different regarding the covariates we use 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 sectors, we examine if this concern impacts our results.

We start by comparing the covariates we use as controls in our regressions across Romanian firms operating in movable-intensive sectors (treatment group) and firms in nonintensive sectors (control group). The comparison is reported in panel A of Table 12, where median difference tests suggest that firms in the treated and control groups are particularly different in dimensions, such as size and age.

TABLE 12 ABOUT HERE

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 control units. 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. The tests reported in panel A of Table 12 show the success of our matching: the median size, age, profitability, and overall tangibility is virtually identical across firms in the high- and low-movable-assets sectors after the matching is performed.

We then proceed to perform a differences-in-differences test, controlling for immovable intensity, computing the Abadie-Imbens' average treatment effect on the treated estimate (ATT). We report the results for our main outcome variables (*Leverage*, *ZeroLeverage*, and *Cash*) in panel B of Table 12. For ease of reference, we also report the benchmark regression results for Romania associated with these same outcomes, collected from previous tables. The estimates are remarkably similar across the two methodologies and are estimated more precisely. In fact, after performing the matching procedure, the effect of the collateral reform on *ZeroLeverage* becomes statistically significant at the 10% level.

6. 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 (e.g., land and buildings) as collateral; they did not accept movable assets (e.g., machinery and equipment). Investment in machinery and equipment could be financed only through leasing and unsecured lending with contractual provisions. In 2000, Romania passed a law that drastically improved the legal treatment of movable assets as collateral (Law 99), giving firms a new alternative for financing machinery and equipment. In this paper, we study the impact of this reform on the availability of credit and real economic activity in Romania. We then generalize our analysis to a broader group of Eastern European countries, some of which passed similar reforms during our sample period.

We find that after the passage of Law 99, Romanian firms operating in sectors with more intensive use of movable assets borrowed significantly more and hoarded less cash. We observe the same pattern of findings across firms in the broader Eastern European sample, which adds

external validity to our results. We take our analysis one step further and study the real-side implications of the reform-induced increase in access to credit. According to our results, after reforms enlarging collateral menus are passed, firms in movable-intensive sectors invest more in fixed assets, hire more workers, and become more efficient and profitable. These reforms have profound consequences for the industrial structure of the economies affected, leading to an increase in the share of aggregate fixed assets and employment allocated to sectors intensive in movable assets.

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 relationship 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 emerging market countries, where policy makers 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
A description of collateral reforms in Eastern European countries

This table provides a brief description of the collateral laws passed between 1996–2005 in ten Eastern European countries. For the six reforming countries (Bulgaria, Estonia, Hungary, Latvia, Lithuania, Poland, and Romania), 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 nonreforming countries, we report the existing legal framework for secured transactions throughout the sample period.

Country	Collateral law
Bulgaria	Law on Registered Pledges: September 22, 1996 (effective from April 1, 1997) Allowed nonpossesory 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: June 5, 1996 Allowed nonpossesory interests over movables and created registry for movables (Commercial Pledge Register)
Hungary	Amendment to the Civil Code: April 9, 1996 Allowed nonpossesory interests over movables and created registry for movables (Charges Register)
Latvia	Law on Commercial Pledge: October 21, 1998 (effective from March 1, 1999) Allowed nonpossesory interests over movables and created registry for movables (Commercial Pledge Register)
Lithuania	Law on Pledge over Movable Assets: June 10, 1997 Allowed nonpossesory interests over movables and created registry for movables (Hypothecary Register)
Poland	Law on Registered Pledge: December 6, 1996 (effective from January 1, 1998) Allowed nonpossesory interests over movables and created registry for movables (Pledge Registry)
Romania	Law 99 Title VI, "Legal Treatment of Security Interests in Personal Property": May 27, 1999 (effective from December 1, 2000) Allowed nonpossesory interests over movables, created registry for movables, and allowed out-of-court enforcement
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 2
Summary statistics of the main variables

This table reports the summary statistics of *Leverage*, *ZeroLeverage*, and *Cash* for each of the ten countries in the sample, 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-year has zero leverage and zero otherwise, and *Cash* is the ratio of cash holdings to total assets.

	Leverage			*ZeroLeverage*			*Cash*		
	Obs	Mean	SD	Obs	Mean	SD	Obs	Mean	SD
Bulgaria	28710	0.097	0.201	29819	0.541	0.498	27876	0.143	0.195
Czech Republic	24048	0.127	0.183	24312	0.277	0.448	23845	0.101	0.128
Estonia	17079	0.095	0.166	17732	0.504	0.500	17598	0.159	0.195
Hungary	4720	0.098	0.145	5590	0.236	0.425	3070	0.095	0.124
Latvia	3436	0.189	0.213	3537	0.127	0.333	3382	0.055	0.080
Lithuania	4242	0.115	0.156	4524	0.284	0.451	4231	0.057	0.084
Poland	22145	0.100	0.153	26172	0.254	0.435	22752	0.066	0.096
Romania	209415	0.105	0.229	238558	0.572	0.495	225707	0.079	0.140
Russia	104576	0.044	0.148	106328	0.729	0.444	97503	0.085	0.150
Ukraine	19292	0.068	0.155	19295	0.413	0.492	18660	0.026	0.061

Table 3
Pre-reform trends in treated and control groups in Romania

This table reports the average change in *Leverage* (panel A), *ZeroLeverage* (panel B), and *Cash* (panel C) for Romanian 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 is conformed by firms in the sectors below the bottom quartile. The first row in each panel reports statistics for the change going back one year 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
	Panel 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
	Panel 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
	Panel 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 4
The effect of collateral reform in Romania: Leverage ratio

This table presents the results from the following regression for Romania:

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

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 afterward. $HighAssetType_s$ is a dummy 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)
		Romania	
*Post*High OverallTangibility*	0.012**		
	(0.006)		
*Post*High MovableAssets*		0.024***	0.037***
		(0.006)	(0.013)
*Post*High ImmovableAssets*			-0.019
			(0.013)
Size	0.017***	0.018***	0.019***
	(0.002)	(0.002)	(0.002)
Age	0.009***	0.008***	0.009***
	(0.001)	(0.001)	(0.001)
Profitability	-0.061***	-0.061***	-0.062***
	(0.004)	(0.004)	(0.004)
OverallTangibility	0.022***	0.019***	0.019***
	(0.006)	(0.006)	(0.006)
Firm fixed effects	yes	yes	yes
Year fixed effects	yes	yes	yes
Observations	111,959	111,880	90,492
R-squared	0.584	0.584	0.580

Table 5
The effects of collateral reforms in Eastern Europe: Leverage ratio

This table presents the results from the following regression for the 10 Eastern European countries:

$$Leverage_{ist} = \alpha_i + \alpha_{ct} + \beta Post_{ct} * HighAssetType_s + \gamma X_{ist} + \epsilon_{ist},$$

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 afterward for each country. $HighAssetType_s$ is a dummy 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 country-year fixed effects (α_{ct}). The standard errors are clustered at the country level.

	(1)	(2)	(3)
	Eastern Europe		
*Post*High OverallTangibility*	0.036**		
	(0.015)		
*Post*High MovableAssets*		0.041**	0.047***
		(0.015)	(0.008)
*Post*High ImmovableAssets*			-0.007
			(0.009)
Size	0.012***	0.013***	0.014***
	(0.003)	(0.003)	(0.004)
Age	0.008	0.008	0.010
	(0.006)	(0.006)	(0.006)
Profitability	-0.059***	-0.060***	-0.061***
	(0.002)	(0.002)	(0.002)
OverallTangibility	0.026***	0.024***	0.024***
	(0.006)	(0.007)	(0.007)
Firm fixed effects	yes	yes	yes
Country-year fixed effects	yes	yes	yes
Observations	175,522	174,774	140,695
R-squared	0.623	0.623	0.619

Table 6
The effects of collateral reforms: Propensity to use debt

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

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

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 afterward. $HighMovableAssets_s$ 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). Columns (1) and (2) report the results for Romania, and columns (3) and (4) report the results for the sample of ten Eastern European countries. Columns (3) and (4) replace year fixed effects with country-year fixed effects (α_{ct}). Columns (2) and (4) control for the interaction between *Post* and *HighImmovableAssets*. The standard errors in columns (1) and (2) are clustered at the firm level and in columns (3) and (4) are clustered at the country level.

	(1)	(2)	(3)	(4)
	Romania		*Eastern Europe*	
*Post*High MovableAssets*	-0.159***	-0.324	-0.180***	-0.208**
	(0.056)	(0.337)	(0.018)	(0.083)
*Post*High ImmovableAssets*		0.184		0.039
		(0.338)		(0.085)
Size	-0.053***	-0.052***	-0.150***	-0.150***
	(0.002)	(0.002)	(0.006)	(0.031)
Age	-0.281***	-0.297***	-0.018	-0.022
	(0.012)	(0.018)	(0.021)	(0.079)
Profitability	0.058***	0.058***	0.153***	0.152***
	(0.005)	(0.006)	(0.012)	(0.009)
OverallTangibility	-0.111***	-0.111***	-0.259***	-0.251***
	(0.010)	(0.012)	(0.024)	(0.046)
Firm fixed effects	yes	yes	yes	yes
Year fixed effects	yes	yes	no	no
Country-year fixed effects	no	no	yes	yes
Observations	123,946	100,331	188,963	152,259
R-squared	0.634	0.631	0.663	0.661

Table 7
The effects of collateral reforms on cash holdings

This table presents the results from the following regression:

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

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 afterward. $HighMovableAssets_s$ 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). Columns (1) and (2) report the results for Romania, and columns (3) and (4) report the results for the sample of ten Eastern European countries. Columns (3) and (4) replace year fixed effects with country-year fixed effects (α_{ct}). Columns (2) and (4) control for the interaction between *Post* and *HighImmovableAssets*. The standard errors in columns (1) and (2) are clustered at the firm level and in columns (3) and (4) are clustered at the country level.

	(1)	(2)	(3)	(4)
	Romania		*Eastern Europe*	
*Post*High MovableAssets*	-0.019***	-0.026***	-0.017***	-0.023***
	(0.004)	(0.010)	(0.006)	(0.009)
*Post*High ImmovableAssets*		0.010		0.014
		(0.009)		(0.009)
Size	-0.015***	-0.015***	-0.017***	-0.017***
	(0.001)	(0.001)	(0.001)	(0.001)
Age	0.011***	0.011***	0.004***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)
Profitability	0.068***	0.067***	0.068***	0.067***
	(0.002)	(0.003)	(0.002)	(0.002)
OverallTangibility	-0.051***	-0.053***	-0.050***	-0.051***
	(0.003)	(0.003)	(0.003)	(0.003)
Firm fixed effects	yes	yes	yes	yes
Year fixed effects	yes	yes	no	no
Country-year fixed effects	no	no	yes	yes
Observations	123,510	99,968	187,585	151,150
R-squared	0.623	0.619	0.678	0.674

Table 8
The effects of collateral reforms on other corporate outcomes

This table presents the results from the following regression for the ten Eastern European countries:

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

where Y is the is the outcome variable 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 afterward for each country. $HighMovableAssets_s$ 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 country-year fixed effects (α_t). The specification controls for the interaction between *Post* and $HighImmovableAssets$. The standard errors are clustered at the country level.

	(1) *Investment*	(2) *Employment*	(3) *Productivity*	(4) *Profitability*	(5) *Sales*
*Post*High MovableAssets*	0.038***	0.026**	0.034***	0.034**	0.026***
	(0.015)	(0.016)	(0.016)	(0.019)	(0.014)
*Post*High ImmovableAssets*	0.007	0.009	0.011	-0.004	0.002
	(0.001)	(0.005)	(0.008)	(0.009)	(0.004)
Size	0.022***	0.026***	-0.052***	-0.014	-0.078***
	(0.001)	(0.004)	(0.006)	(0.009)	(0.002)
Age	0.004**	0.008**	0.013**	0.011*	0.004**
	(0.002)	(0.003)	(0.005)	(0.005)	(0.002)
Profitability	-0.007***	-0.001	-0.035***		-0.033***
	(0.001)	(0.002)	(0.001)		(0.003)
OverallTangibility	-0.043***	0.013***	0.036***	0.037***	0.024***
	(0.004)	(0.002)	(0.003)	(0.006)	(0.003)
Firm fixed effects	yes	yes	yes	yes	yes
Country-year fixed effects	yes	yes	yes	yes	yes
Observations	152,186	152,259	152,259	152,259	152,259
R-squared	0.543	0.966	0.903	0.973	0.984

Table 9
Placebo test

We falsely assume that Romania's three neighboring countries (Bulgaria, Hungary, and Ukraine) and Italy, its main commercial partner, implemented a collateral reform in the same year as 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 afterward. $HighMovableAssets_s$ 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 specification controls for the interaction between *Post* and *HighImmovableAssets*. The standard errors are clustered at the firm level.

	(1) Bulgaria	(2) Hungary	(3) Ukraine	(4) Italy
*Post*High MovableAssets*	-0.017	-0.016	0.033	0.001
	(0.017)	(0.053)	(0.073)	(0.002)
*Post*High ImmovableAssets*	-0.010	-0.018	0.001	-0.007
	(0.007)	(0.095)	(0.004)	(0.006)
Size	0.051***	0.034	0.039***	0.029
	(0.009)	(0.141)	(0.009)	(0.024)
Age	0.014*	-0.009	-0.013*	-0.001***
	(0.008)	(0.026)	(0.007)	(0.000)
Profitability	-0.027	-0.015	-0.055**	-0.018
	(0.019)	(0.148)	(0.025)	(0.020)
OverallTangibility	0.019	0.036	0.021	0.067***
	(0.022)	(0.031)	(0.022)	(0.006)
Firm fixed effects	yes	yes	yes	yes
Year fixed effects	yes	yes	yes	yes
Observations	6,539	4,700	9,859	159,202
R-squared	0.715	0.991	0.814	0.638

Table 10
Controlling for business cycle

This table presents the results from the following regression for Romania:

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

where Y is either *Leverage*, *ZeroLeverage*, or *Cash* for firm i in sector s in year t. *Post* is a dummy equal to zero before the reform date and one afterward. $HighMovableAssets_s$ 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 specification controls for the interaction between *Post* and $HighImmovableAssets$. The standard errors are clustered at the firm level.

	(1) *Leverage*	(2) *ZeroLeverage*	(3) *Cash*
*Post*High MovableAssets*	0.040***	-0.365	-0.040***
	(0.014)	(0.188)	(0.013)
*Post*High ImmovableAssets*	-0.002	0.082	-0.003
	(0.015)	(0.129)	(0.012)
*Post*High Sensitivity*	-0.016	0.110	0.002
	(0.011)	(0.377)	(0.008)
Size	0.018***	-0.052***	-0.014***
	(0.001)	(0.002)	(0.001)
Age	0.006***	-0.024***	0.014***
	(0.002)	(0.001)	(0.002)
Profitability	-0.061***	0.051***	0.065***
	(0.003)	(0.006)	(0.003)
OverallTangibility	0.018***	-0.117***	-0.051***
	(0.005)	(0.012)	(0.004)
Firm fixed effects	yes	yes	yes
Year fixed effects	yes	yes	yes
Observations	79,512	88,375	88,040
R-squared	0.578	0.640	0.615

Table 11
Dosage effects

This table presents the results from the following regression for Romania:

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

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 afterward. $HighMovableAssets_s$ 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 specification controls for the interaction between *Post* and $HighImmovableAssets$. The standard errors are clustered at the firm level.

	(1)	(2)	(3)	(4)
*Post*High MovableAssets*$_{Q4-Q1}$	0.037***			
	(0.013)			
*Post*High ImmovableAssets*$_{Q4-Q1}$	-0.019			
	(0.013)			
*Post*High MovableAssets*$_{Q3-Q1}$		0.020**		
		(0.009)		
*Post*High ImmovableAssets*$_{Q3-Q1}$		-0.005		
		(0.014)		
*Post*High MovableAssets*$_{Q3-Q2}$			0.002	
			(0.007)	
*Post*High ImmovableAssets*$_{Q3-Q2}$			0.000	
			(0.007)	
*Post*MovableAssets*				0.042**
				(0.020)
*Post*ImmovableAssets*				-0.018
				(0.026)
Size	0.018***	0.015***	0.013***	0.018***
	(0.002)	(0.003)	(0.003)	(0.001)
Age	0.111***	0.152	0.095***	0.064
	(0.035)	(0.164)	(0.023)	(0.047)
Profitability	-0.066***	-0.079***	-0.067***	-0.068***
	(0.004)	(0.007)	(0.007)	(0.003)
OverallTangibility	0.019***	0.040***	0.031***	0.027***
	(0.006)	(0.012)	(0.011)	(0.005)
Firm fixed effects	yes	yes	yes	yes
Year fixed effects	yes	yes	yes	yes
Observations	90,492	11,222	33,820	194,302
R-squared	0.580	0.628	0.596	0.595

Table 12
Matching estimation

Panel A compares the properties of the treated, control, and matched-control firms in Romania, regarding the four covariates: *Size*, *Age*, *Profitability*, and *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. Before matching indicates 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. After matching reports the same statistics for the treated and control group after matching. Panel B reports the estimates of the effect of the collateral reform in Romania on *Leverage*, *ZeroLeverage*, and *Cash*, controlling for immovable intensity. For ease of reference, the first row reproduces the estimates of the benchmark estimator from Tables 4, 6, and 7. The second row reports the average treatment effect of the treated (ATT), controlling for immovable intensity, after matching the treated and control group according to the four covariates.

Panel A: *Median for treated, control, and matched control group*

	Size	*Age*	*Profitability*	*Tangibility*
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
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

Panel B: *Benchmark and matching estimations*

	Leverage	*ZeroLeverage*	*Cash*
Benchmark estimator	0.037***	-0.324	-0.026***
	(0.013)	(0.337)	(0.010)
ATT estimator	0.035***	-0.348*	-0.025***
	(0.005)	(0.183)	(0.004)