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CREDITOR RIGHTS, ENTREPRENEURSHIP, AND PRODUCTIVITY

BY

NURI ERSAHIN

DISSERTATION

Submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy in Finance
in the Graduate College of the
University of Illinois at Urbana-Champaign, 2018

Urbana, Illinois

Doctoral Committee:

Assistant Professor Rustom Irani, Chair. Director of Research
Professor Heitor Almeida
Professor Scott Weisbenner
Associate Professor Yuhai Xuan

ABSTRACT

The first essay, Creditor Rights and Entrepreneurship: Evidence from Fraudulent Transfer Law, examines entrepreneurship following the adoption of modern-day fraudulent transfer laws in the United States. These laws remove the burden of proof from creditors attempting to claw back funds that were transferred out of failing businesses. They are particularly important for entrepreneurs whose personal assets are often commingled with those of the firm. Using establishment-level data from the U.S. Census Bureau, I document declines in startup entry, churning among entrants, and closures of existing ventures after the passage of these laws. Thus, strengthening creditor rights can impede entrepreneurial activity and the process of reallocating capital from failing to new businesses.

In the second essay, Creditor Rights, Technology Adoption, and Productivity: Plant-Level Evidence, I analyze the impact of stronger creditor rights on productivity using plant-level data from the U.S. Census Bureau. Following the adoption of anti-recharacterization laws that give lenders greater access to the collateral of firms in financial distress, total factor productivity of treated plants increases by 2.6 percent. This effect is mainly observed among plants belonging to financially constrained firms. Furthermore, treated plants invest in capital of younger vintage and newer technology, and become more capital-intensive. My results suggest that stronger creditor rights relax borrowing constraints and help firms adopt more efficient production technologies.

The third essay, Creditor Control Rights and Resource Allocation within Firms, examines the within-firm resource allocation and restructuring outcomes at firms violating debt covenants. We use establishment-level data from the U.S. Census Bureau to demonstrate that covenant violations are followed by reductions in employment, investment, and more frequent establishment closures among violating firms' noncore business lines and underperforming establishments. These changes are pronounced when key lenders have prior industry experience. Thus, refocusing operations and improving productive efficiency via resource reallocation are important channels through which enhanced creditor rights can facilitate the turnaround of firms in technical default.

To my parents and my sister, for their love and support.

ACKNOWLEDGMENTS

This research was funded in part by the Ewing Marion Kauffman Foundation. The contents of this publication are solely the responsibility of Nuri Ersahin.

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CHAPTER 1

CREDITOR RIGHTS AND ENTREPRENEURSHIP: EVIDENCE FROM FRAUDULENT TRANSFER LAW

1.1. Introduction

The unsecured creditors of a failing small business are not in a position of significant authority. High fixed costs associated with Chapter 11 usually destroy any of the value of the business that would have gone to unsecured creditors. Unsecured creditors can file for an involuntary Chapter 7 liquidation of the business, but this often requires coordination, and managers of the business can counter with a conversion to Chapter 11. In fact, most small businesses deal with insolvency by relying on state rather than federal bankruptcy law. But state laws, which generally concern secured creditors, can be even less friendly to unsecured creditors. One of the few protections afforded to the unsecured creditors of a small business lies in fraudulent transfer law.

Consider, as an example, a grocer whose business is failing. If he were to take the remaining cash out of the registers and deposit it into a bank account while his unsecured creditors—his fruit and vegetable vendors—remained unpaid, this would constitute a fraudulent transfer. The vendors would have the right to sue him in state court according to fraudulent transfer law and be repaid out of the funds that were originally in the cash register. Fraudulent transfer laws come in two forms: actual fraud, in which the burden of proof lies on the creditors to prove that the business owner intended to defraud them, and constructive fraud, in which the burden of proof lies on the business owner to prove that the transfer was an equivalent exchange of value. In the example of the grocer, an unsecured creditor acting as a plaintiff under actual fraud law would have to prove that the grocer intended to defraud. Under constructive fraud law, by contrast, it is straightforward that the business received far less than equivalent value as a result of the transfer (i.e., nothing).[1]

In this paper, we document the effects of switching from actual to constructive fraud law on entrepreneurial activity. As motivated by the example above, such a regime change represents

[1]In reality, a transfer such as the grocer's would probably be overturned according to actual fraud law as well. This simple example illustrates the difference between a system in which the burden of proof is on creditors and one in which the burden of proof is on the business owner.

an increase in expected payoffs to unsecured creditors in adverse scenarios. It therefore should increase the availability of unsecured credit, boosting new business formation. At the same time, however, risk-averse entrepreneurs may respond by declining to enter into new ventures because of the lower payoffs they face in insolvency.[2] Whether the net effect on business formation is positive or negative is an open question.

Fraudulent transfer law in the United States. was originally borrowed from England, which relied on the actual definition of fraud. While most states gradually adopted the constructive definition of fraud in the early part of the 20th century, a subset of states updated their legal definitions of fraud more recently—Iowa, Kansas, Vermont, and the District of Columbia in the period from 1992 to 2007. This allows us to examine the effects of the staggered adoption of these law changes for entrepreneurship in a difference-in-differences (DiD) framework.

Drawing on establishment-level data from the U.S. Census Bureau, we find that states experience a significant decline in entrepreneurial activity in the years following the adoption of constructive fraud laws. We observe substantial declines in both startup entry and closure rates after the passage of constructive fraud laws. The decrease in entry rates occurs among the smallest businesses that succeed or fail within three years of starting up, suggesting creditors are not simply screening out riskier borrowers. We find similar negative effects when we compare startup entry and exit with adjustments made by incumbent, multi-unit firms that are unlikely to capture entrepreneurial activity.

While central focus of this paper is on small businesses, large businesses may rely on fraudulent transfer law as well, usually through bankruptcy.[3] We posit that the impact of constructive fraud laws, to the extent that they hinder business growth, should be stronger for startups because, first, entrepreneurs are more likely to have personal assets commingled with those of the business, and second, large businesses are more likely to reorganize or have control over matters of jurisdiction in insolvency. To support these views, we examine the heterogeneity of the average treatment effect. Sorting based on organizational form and size, we find that the effects are driven by single-unit firms and the smallest firms with between one and five employees. These effects hold even within state-year-industry cells, which alleviates the concern that coincident state-level unobservable factors such as the non-economic legal environment or social dynamics may have led to the decline in startup creation. Furthermore, we find that effects are present only for firms in industries with low levels of startup capital, where owners' financing using personal assets as collateral is more

[2]Landier (2005) shows theoretically that debtor protection in bankruptcy is more suitable for entrepreneurship and innovation by fostering experimentation. In a related analysis, Manso (2011) demonstrates that the optimal compensation scheme to promote innovation tolerates failure.

[3]Even though bankruptcy is a federal procedure, provisions exist that allow courts to defer to state law on matters of fraudulent transfer.

likely to be feasible.

Because state laws are often open to interpretation, it can be difficult to measure the strictness with which various statutes apply. An additional challenge is that during our event window, only the District of Columbia, Iowa, Kansas, and Vermont underwent drastic fraudulent transfer law changes. To ensure a broad effect, we show that the results hold for each of these states individually. We run additional tests including Indiana, which had some case law on constructive fraud prior to the passage of new statutory law, and find consistent results. The inclusion of states that had some preexisting statutory law on constructive fraud and then passed comprehensive definitions of constructive fraud, however, weaken the results. We also check for robustness by excluding Alaska, which never passed constructive fraud laws, excluding states that were treated immediately prior to the sample horizon, and excluding Louisiana, which went through a period of uncertainty regarding the statutory law on fraudulent transfers. In all of these tests, our results hold. Finally, we show our results do not reflect changes to related laws on insider preferences, which were sometimes enacted alongside the redefinition of fraud.

Taken together, our findings indicate that expanding laws that allow unsecured creditors to reclaim a higher fraction of assets upon business failure discourage startup creation and extend the survival of old ventures. This suggests that entrepreneurs may become constrained in their ability to redeploy assets into new and potentially more productive uses.

Our paper contributes to the literature on the relationship between law, credit markets, and growth that began with the work of La Porta et al. (1998). This literature initially connected strong creditor protections with favorable credit market conditions in cross-country analyses, evolving to show that in some circumstances, creditor rights might be too strong and have adverse consequences.[4] Our approach relates to recent studies that use within-country regulatory changes to identify exogenous variation in creditor rights. Several papers analyze the effects of debt recovery tribunals in India that reduce the cost of enforcing debt contracts. Notably, Visaria (2009) finds that these tribunals improve repayment behavior and make loan terms more favorable, and von Lilienfeld-Toal et al. (2012) find that they promote access to credit only for large borrowers, while weakening access to credit for small borrowers. Vig (2013) observes a similar negative impact of a 2002 law in India that strengthened

[4]Cross-country evidence suggests that countries with stronger investor and creditor protections have larger and more robust capital markets (La Porta et al., 1997; Giannetti, 2003; Qian and Strahan, 2007), and better banking systems with higher credit growth (Levine and Zervos, 1998; Djankov et al., 2007). Haselmann et al. (2010) demonstrate, more specifically, that countries that improved collateral laws were met with stronger credit markets and increases in economic activity (see also Campello and Larrain, 2016; Calomiris et al., 2016). In contrast, Acharya and Subramanian (2009) find that changes to bankruptcy codes in favor of creditors result in lower investment in R&D and levels of innovation. Similarly, Acharya et al. (2011) find that countries with strong creditor rights have lower levels of risk-taking and operating performance.

the rights of secured creditors. He finds that the reform led to reductions in asset growth and a substitution from secured to unsecured debt, consistent with large firms with multiple financing options contracting around a liquidation bias among creditors. Our contribution is to examine the importance of creditor rights for entry and exit rates among entrepreneurial firms in the U.S. economy. We focus on a legal protection that affects unsecured creditors, in contrast to related work that considers secured creditor rights in isolation. Our results suggest that strengthening unsecured creditor rights—by allowing for greater access to entrepreneurs' assets during insolvency—can impede business formation and the process of reallocating capital from failed to entering businesses.

Our paper is also related to the literature on personal bankruptcy exemptions. While these exemptions are the most basic protection of an entrepreneur's assets, they only apply to certain property such as a home or a vehicle, they are relatively limited in some states, and they do not apply to owners of a corporation or LLC. Thus, in some sense, transfers can be thought of as a complementary asset protection strategy, once personal bankruptcy exemptions have been exhausted.[5] Gropp et al. (1997) first connected state personal bankruptcy exemptions to credit conditions, finding that states with high exemptions eased credit conditions for wealthy borrowers and tightened them for low-asset households. Cerqueiro and Penas (2014) find such exemptions reduce credit available to the owner-managers of unlimited liability companies. Most similar in spirit to our study of real effects is Cerqueiro et al. (2015), who find that higher exemption limits reduce the number of patents generated by small firms in the United States, suggesting that reductions in credit supply outweigh the potential risk-sharing benefits when it comes to exploration by innovators. We complement this work by, first, examining more broadly the effects of creditor rights on the various aspects of the entrepreneurial process and, second, by considering a unique and previously unexplored aspect of creditor protection: the definition of fraudulent transfers.

1.2. Institutional Background

When a business becomes insolvent, all of the transactions made in its recent history become a matter of scrutiny. This is because owners may have undergone such transactions in order to place assets beyond the reach of creditors, either for their own personal gain or so that the business may be able to survive longer. Given these incentives and the ability of most business owners to exert significant control over business assets, fraudulent transfer laws have been established in order to prevent debtors from absconding with the business's assets

[5]Appendix B.1.2 describes the relationship between organizational form and asset protection.

in the event of financial distress.

While fraudulent transfer law applies to all debtors, there are several reasons why it is particularly relevant to entrepreneurs. Information asymmetries are extreme because small businesses are subject to few, if any, financial reporting requirements and because monitoring costs are high for external lenders. The owner has significant control over business decisions, and does not have to report to a board or to outside shareholders. As discussed, the assets of small businesses are often commingled with the owner's personal assets, thus exacerbating incentives to hide assets from creditors when the business is in distress.

This section provides an overview of the important components of fraudulent transfer law. The first subsection compares the concepts of actual fraud and constructive fraud. The second subsection reviews the history of fraudulent transfer law in the United States, which is key to understanding the quasi-exogenous nature of the experimental design.

1.2.1. Actual fraud versus constructive fraud

This paper studies the response of small business owners to a strengthening of unsecured creditor rights that resulted from a new set of laws that made it easier for unsecured creditors to reclaim funds transferred out of failing businesses. In the older version of the law, the burden of proof lay on unsecured creditors, whereas in the new version, the burden of proof lies on the business owner. Specifically, according to the older version of the law in which actual fraud had to have been established, unsecured creditors challenging business owners had to prove that the business owners acted with fraudulent intent. Under the new version of the law, known as constructive fraud, as long as any transfer of assets out of the business are not an equivalent exchange of value from the perspective of the business and the business was close to or in a state of insolvency, the transfer can be nullified.

Most fraudulent transfer statutes that relied on actual fraud contained the following text: "every gift, grant, conveyance, assignment or transfer... made with the intent to disturb, delay, hinder or defraud creditors... shall be void as against such creditors."[6] As noted in Ayer et al. (2004), "it is usually difficult to find good, non-circumstantial evidence of 'actual intent to hinder, delay, or defraud.' People do not tend to admit to such 'evil' intent." Some judges adopted legal standards that were halfway measures toward a constructive definition of fraud, by acknowledging the existence of badges of fraud. These include transfers to insiders, concealed transfers, transfers of all the debtors' assets, and transfers in which the business did not receive equivalent value in exchange. What is relevant for our research design, however, is that it is up to the judge in states with actual fraud laws to determine

[6]This particular passage was an excerpt from I.L. R.S. 1874, §4.

the standards of proving fraudulent intent.

States that adopted a constructive definition of fraud are those that: (i) added to their fraudulent transfer statute; or (ii) replaced the text of their statutes with a passage allowing for a more expansive definition of fraud. Most fraudulent transfer statutes that rely on constructive fraud contain the following text: "without receiving a reasonably equivalent value in exchange for the transfer" and "was engaged... in a business or a transaction for which the remaining assets of the debtor were unreasonably small."[7] The insertion of this phrase allowed creditors to attack transactions on the grounds that reasonably equivalent value was not delivered to the business as a result of the transfer. The fact that creditors remain unpaid is grounds for the scarcity of remaining assets.

Because the changes that were made to the definition of constructive fraud happened incrementally across states, and also because of variations in case law across judges, it is difficult to measure the degree to which statutory law on fraudulent transfers has been deemed favorable toward creditors. In order to overcome this problem, we consider only states that had no statutory or case law acknowledging constructive fraud prior to the adoption of the Uniform Fraudulent Transfer Act (UFTA), introduced below. To identify these states, we read the text of each state's annotated statutes. Portions of each state's statutes are grouped by topic and updated every several years based on the frequency of changes. We compared each statute regarding transfers in the version immediately before the passage of the UFTA to the version immediately after the passage of the UFTA. We also read the case law for each statute related to fraudulent transfer. Ultimately, we focus on three states and the District of Columbia because they underwent drastic transitions from intent-based to constructive-based fraudulent transfer regimes.

1.2.2. The history of fraudulent transfer law

Most states in the United States imported their fraudulent transfer laws from England. English fraudulent transfer law was based on the Statute of 13 Elizabeth (1571), which declared void all transfers made with the "purpose and intent to delay, hinder or defraud creditors." As financial relationships became more complex, however, these statutes became quickly outdated. The archaic text setting out the rules of fraudulent transfer failed to lay out which types of creditors were protected, which transfers were relevant, which transferees were held liable, whether insolvency was a necessary condition, and how exactly to prove fraud.

In 1918, the National Conference of Commissioners on Uniform State Law (NCCUSL)

[7]This particular passage was an excerpt from N.J. S.A. 1999, §§25:2-20-25:2-34.

drafted a model law that clarified and standardized fraudulent transfer laws in the United States. They promulgated the Uniform Fraudulent Conveyance Act (UFCA), which was eventually adopted by twenty-five states in the following half-century.[8] The UFCA introduced the concept of constructive fraud. Under the UFCA, it would no longer be necessary to prove intent as a mindset in order to undo a transfer by the debtor.

A version of the UFCA was incorporated into the Bankruptcy Act of 1938 and the Bankruptcy Reform Act of 1978 (1978 Act). In its current form, §547-548 of Chapter 11 dictate procedure on fraudulent transfers. Although the Bankruptcy Code is federal, state fraudulent transfer laws may be invoked during a bankruptcy proceeding in place of §548, if one can prove a creditor would have benefited from the use of state law. Because the statute of limitations is usually longer in state law, many creditors find these laws favorable.

After the passage of the 1978 Act, the NCCUSL was reminded that half of the states still retained fraudulent transfer laws dating back to the sixteenth century. In addition, given the rise in complexity of debtor-creditor relations throughout the twentieth century, many states had a multitude of contradictory case rulings. Because of this, judges were left to their own discretion to interpret the statutes as they saw fit. The NCCUSL commented that "[t]here are few legal subjects where there is greater lack of exact definitions and clear understanding" than fraudulent transfer law.[9] In addition to pressure from those involved in the drafting of the 1978 Act, the NCCUSL was also influenced by a number of legal organizations, including the Committee on Corporate Laws and the American Bar Association. A drafting committee for the Uniform Fraudulent Transfer Act (UFTA) was appointed in early 1983, and the law was approved in mid-1984.

The NCCUSL lacks the authority to enact legislation, however, and so following the approval of the UFTA, representatives of NCCUSL contacted state representatives and pressured them to adopt the new uniform act. This initiative was largely successful, and the UFTA was eventually put into law by forty-five states and the District of Columbia. This gradual adoption took place over the twenty-one years spanning the period from 1985 until 2006. Table 1.1 presents the timing of the passage of the UFTA.[10]

The UFTA was not a major overhaul of the UFCA, and so states that had already enacted the earlier version ended up with a relatively similar law following the change. The only major difference was the addition of a new section, §5(b), which invalidated preferential debt payments to insiders. Prior to this addition, states were relatively mixed in their

[8]The NCCUSL is an umbrella authority that makes recommendations to state legislatures.

[9]Uniform Fraudulent Conveyance Act, 7A U.L.A. 428 (1985) (Prefatory note).

[10]Maryland and New York passed the UFCA in the early twentieth century, but never the UFTA. Alaska, Kentucky, South Carolina, and Virginia have yet to adopt a uniform law on fraudulent transfers. Louisiana passed the UFTA in 2003, but almost immediately set in motion the steps to repeal it in 2004.

approaches to insider preferences. Some treated it as a separate category of fraud and had explicit statutes on the voidability of this type of transaction, but most did not have any statutory law regarding this area and left it up to interpretations of fraudulent transfer. Several states, upon adopting the UFTA, opted out of this section. Of the states that had not already enacted the UFCA, some had adopted measures similar to the constructive fraud provisions in the uniform laws on their own. Those that retained statutes similar to 13 Elizabeth experienced the greatest change when they switched to the UFTA.[11]

A key identifying assumption in this paper is that the timing of the passage of constructive fraud laws was unrelated to broader trends in entrepreneurship. Several elements of historical context support this assumption. First, a primary impetus of the NCCUSL's decision to revisit fraudulent transfer law in 1983 was the lack of legal cohesion across states, and not any particular attitude toward the business environment. Second, because it originated in the NCCUSL, the legislators who passed the UFTA were probably less invested in the material of the act relative to laws that they drafted themselves. Further evidence for this lies in the fact that the adoption of constructive fraud laws took place in bursts, after the NCCUSL urged the states to do so (both in 1918 and 1984), and not in response to the business cycle. Finally, the coupling of constructive fraud law with preferential transfer law in some states but not others allows us to isolate the effects of the constructive fraud element from general motivations to adopt the UFTA.

1.3. Data and Empirical Methodology

1.3.1. Data sources

We gather legal data from a variety of sources. First, we use state historical statutes, available through Hein's Superseded State Statutes and State Session Laws microfiche collections.[12] Superseded State Statutes provides a snapshot of each state's laws through time, while State Session Laws contains all laws passed by each state's general assembly in each year. Because of the incremental nature of changes that were made to the definition of constructive fraud, we construct a timeline of fraudulent transfer law for each state. To construct this timeline, we begin with the session law that introduced the UFTA, obtained from ThomsonWest's Uniform Laws Annotated. We then make use of the references to the prior fraudulent

[11] In July 2014, the UFTA was renamed the Uniform Voidable Transactions Act (UVTA). Although the substance of the law was effectively unchanged, the new name now reflects the fact that the law gives creditors the power to undo a much broader set of transactions than those that fall within the scope of fraud.

[12] These collections were accessed through the New York University Law Library. Some state statutes were supplemented by West's State Statutes Annotated and Harrison Company's State Statutes Annotated.

conveyance laws that were either amended or repealed by the UFTA, which is provided in the text of the UFTA for most adopting states. We retrieve the most recent version of the fraudulent conveyance law either amended or repealed by the UFTA from the Superseded State Statutes. We obtain the evolution of each state's laws due to the fact that, in nearly all states, these statutes are annotated with the history of amendments as well as the relevant case law.[13]

Our establishment-level data set comes from the Longitudinal Business Database (LBD) of the U.S. Census Bureau. The LBD is an administrative register of all private business establishments in the United States that is updated annually. Establishments are identified as locations with at least one paid employee, and could belong to privately held or publicly traded firms. The data contain information on the number of employees, payroll, industry codes, and physical location for each establishment at the annual frequency. The LBD also provides information on corporate ownership, which helps us identify which firm an establishment belongs to in a given year. These corporate affiliation data are crucial for the correct measurement of entrepreneurial activity, as entering establishments might represent an expansion of a potentially large preexisting ("multi-unit") firm as opposed to startup activity (i.e., entry by a standalone or "single-unit" firm). Such distinctions cannot be made with publicly available, aggregated versions of the Census data (for example, the County Business Patterns data). Our sample spans the period from 1992 until 2007.

Finally, a key variable for our analysis is the amount of capital required to start a firm. Since the adoption of fraudulent transfer law is particularly important for entrepreneurs whose personal assets are commingled with the business's assets, its effect on business creation might vary across industries depending on the amount of startup capital required. The Characteristics of Business Owners (CBO) Survey, which is a part of the 1992 Economic Census, provides economic and demographic information on business owners in the United States. We use data from the survey responses on "Total Capital Needed by Owner to Start/Acquire the Business by Industry Division" to determine the amount of startup capital required at the industry level (Hurst and Lusardi, 2004).

[13]For Oregon, we retrieve case law on fraudulent conveyances prior to the UFTA from Westlaw Next. For either states that did not adopt UFTA (South Carolina, Alaska, Kentucky, and Virginia) or states where references to repealed statutes were not available in the text of UFTA (Arkansas, Hawaii, Kansas, Missouri), we constructed a legal history by canvassing all laws concerning debtor-creditor relations, statutes of fraud, and bulk transfer laws. All these states except for Hawaii had fraudulent transfer laws resembling 13 Elizabeth.

1.3.2. Variable construction and summary statistics

We examine four dependent variables to measure the effects of the UFTA on entrepreneurial activity: business starts, the success and failure rates of new businesses, and the closure rates of incumbent establishments. These variables are measured at the state-year and state-industry-year levels. We further disaggregate these measures by establishment size (i.e., number of employees) and firm type, where the latter indicates whether entry or exit occurs at a standalone firm or among the facilities of a multi-unit firm.

The first dependent variable is the natural logarithm of the number of new establishments. We define the year of entry to be the first year with positive employment. We define entrepreneurship as the entry of new, standalone firms. The second and third dependent variables are related to the subsequent survival of these entrants. The LBD provides establishment identifiers that allow us to track them over time and identify exits. We focus on a three-year window after entry and define "churning entrants" as the (log) number of establishment entries that close within this period. We analogously define "long-term entrants" as the (log) sum of those entering establishments that survive three years. Finally, we also consider the (log) number of establishment closures, where the establishment-level year of closure is defined to be the last year with positive employment. This measure captures the closure rate among both entrant and incumbent establishments.

The main independent variable is an indicator variable that equals one if the state defines fraud according to the constructive view. This includes states that have passed the UFCA or UFTA, states with "good consideration" or "voluntary conveyance" statutes, or states in which case law exists that allows creditors to reverse transfers based solely on the economic circumstances of the debtor. The indicator variable *UFTA* equals zero if: (i) the state has no case law allowing creditors to reverse transfers based solely on the economic circumstances of the debtor; and, (ii) the statutory law either contains no mention of fraudulent transfers or its fraudulent transfer statutes were based on 13 Elizabeth. This is our preferred definition of the independent variable, as it ensures that we identify off of states adopting constructive fraud law for the first time.

Table 1.1 presents the adoption year of fraudulent transfer laws on a state-by-state basis. Alaska, Kentucky, Maryland, New York, Pennsylvania, South Carolina, and Virginia did not adopt the UFTA. Table 1.1 also presents the effective year of insider preference laws and, in the final column, whether there is a preexisting law on fraudulent transfers prior to the passage of the UFTA for each state. To illustrate how our independent variable works, consider Alabama (AL) and Iowa (IA). Alabama and Iowa adopted the UFTA in 1990 and 1995, respectively. However, Alabama had either case or statutory law defining fraud constructively, whereas Iowa did not. Thus, the independent variable always takes the

value of one for Alabama, whereas it takes the value of zero before 1995 and one after 1995 for Iowa. Our definition of the treatment variable coupled with our event window from 1992 to 2007 confines our analysis to three states, Kansas, Iowa, Vermont, and the District of Columbia that switch from being untreated to treated.[14]

Table 1.2 presents summary statistics for entering establishments between 1992 and 2007. Entering establishments are classified into two groups: churning entrants, which close within three years of entry, and long-term entrants, which survive at least three years. Entry is further broken down according to firm status. Single-unit entry indicates that the entering establishment is a new standalone firm, which we interpret as entrepreneurship. On the other hand, multi-unit entry corresponds to expansions of already existing firms. The statistics reported in Table 1.2 provide information about the size, sector, and geography of entering establishments. Several notable facts emerge. First, single-unit firms constitute 83 percent of all the entrants. The majority of entrants survive for longer than three years, with 66 percent being long-term versus 34 percent being churning entrants. Second, the size distribution indicates that most (70 percent) of these new businesses start with between one and five employees. On average, churning entrants start with fewer employees than long-term entrants. The industry sector distribution statistics show the spread of our sample across Manufacturing, Services, Wholesale Trade, Retail Trade, Mining, Construction, and Transportation. The majority of entrepreneurs start their businesses in the Services and Retail Trade industries with 43 percent and 22 percent, respectively.

1.3.3. Identification and empirical model

To examine how changes in creditor rights may impact entrepreneurial activity, we begin our analysis at the state-year level with the following specification:[15]

$$y_{st} \;=\; \alpha_s \;+\; \alpha_t \;+\; \beta \cdot UFTA_{st} \;+\; \epsilon_{st}, \tag{1.1}$$

where s indexes states and t indexes years. The variable y stands for one of four measures of establishment entry and exit: the total number of entrants, the number of churning entrants, the number of long-term entrants, or the number of closures. We take the natural logarithm of each of these variables. $UFTA_{st}$ is an indicator variable that equals one if the state has any case or statutory law defining fraud constructively, and zero otherwise. α_s and α_t are state and year fixed effects, respectively. Since the analysis is based on a state-year panel

[14]We have restricted access to the confidential U.S. Census Bureau LBD for this event window only.

[15]Kerr and Nanda (2009) use a similar difference-in-differences (DiD) framework study the effect of state-level bank branching deregulations on entrepreneurial activity.

data, we cluster standard errors by state (Bertrand et al., 2004).

The coefficient of interest, β, measures the average response in percentage points of entrepreneurial activity among states adopting constructive fraud law for the first time. If entrepreneurs face financial constraints and the increase in creditor rights expands the supply of credit, thus boosting business growth, β will be strictly positive for all measures of entry. On the other hand, if risk-averse entrepreneurs with personal assets tied up in their ventures reduce demand for credit, then we may observe a reduction in entrepreneurial activity, which corresponds to a strictly negative β. The null hypothesis is that constructive fraud law is irrelevant for entrepreneurial activity (because financial constraints are not binding, creditor rights are unaffected by constructive fraud law, or the supply and demand response of credit are offsetting), which corresponds to β equal to zero.

Identification of β in Equation (1.1) exploits changes in entrepreneurial activity within-state around the first adoption of constructive fraud law. There are several identification concerns with this approach that we now detail. The first potential issue concerns our definition of treated and control states. Our focus is on those states that underwent the most dramatic change in fraudulent transfer law. In particular, we define constructive fraud (treated) states as those with *any* precedent in defining fraud in the constructive sense (according to either statutory or case law). Nearly all states meet this condition by the end of our event window. Alaska is the only state that never adopted the constructive fraud definition of voidable transfers.[16] In order words, the control group consists of states that are already treated, eventually treated during the sample horizon, as well as Alaska, which is never treated. This classification of states may present a problem if, for example, early adopters of constructive fraud statutes exhibit different growth trajectories. In this case we may have a violation of the parallel trends assumption of our DiD model.

We examine this concern in the following ways. Most importantly, we estimate a dynamic version of Equation (1.1) with indicator variables showing the timing relative to the passage of the UFTA in each state. Within this framework, we can examine if there are any preexisting differential trends in the startup entry and exit rates between the treated and control groups. We also directly examine whether treatment puts states on permanently different growth trajectories, which could compromise the internal validity of our approach. To complement this analysis of dynamics, we consider several alternative control group classifications that either remove the never-treated states (Alaska) or the states that were treated close to the beginning of our event window. We defer the details of these tests to Section 1.4.5.

The second potential concern is that there might be unobservable economic factors corre-

[16] Although a couple of states adopted neither the UFCA or the UFTA, they instead adopted other legislation introducing the constructive definition of fraud to their debtor-creditor relation statutes.

lated with the law change affecting investment opportunities for all firms, including startups. To mitigate this concern, we first show that with the exception of population, which is negatively and significantly associated with the passage of the law, the timing of these laws was uncorrelated with broader macroeconomic trends. To provide further compelling evidence, we exploit the granularity of the LBD and compare activity between single- and multi-unit firms in the same state of location, industry, and year. Since multi-unit entrants correspond to expansions of already existing firms, they are unlikely to represent startup activity. Thus, we use establishment entry and exit rates of already existing, multi-unit firms as a control group to demonstrate that the strengthening of creditor rights only impacts entrepreneurs' incentives. To this end, we refine Equation (1.1) to separately compare both single-unit and multi-unit entrants:

$$y_{sitx} \;=\; \alpha_{six} \;+\; \alpha_{tx} \;+\; \alpha_{sit} \;+\; \beta \cdot \mathit{UFTA}_{st} \times \mathit{Single\text{-}Unit}_{x} \;+\; \epsilon_{sitx}, \tag{1.2}$$

where s, t, i, and x stand for state, year, industry, and type of firm, respectively. $\mathit{Single\text{-}Unit}_x$ is an indicator variable that equals one for single-unit firms. Industries are grouped at the two-digit Standard Industrial Classification (SIC) level, and we exclude the financial and public administration industries. We fully saturate the model with fixed effects—α_{six}, α_{tx}, and α_{sit} at the state-industry-type, time-type, and state-industry-type levels, respectively. The state-industry-year fixed effects are included to sweep out common factors affecting the investment opportunities of both startups and multi-unit firms. We cluster standard errors at the state-type level to account for the disaggregation of our panel data. The coefficient β now measures the mean percentage point response of entrepreneurs relative to multi-unit firms following the passage of the UFTA.

The final concern is that other regulatory changes might occur in conjunction with the first adoption of constructive fraud law. We are particularly interested in changes in anti-insider preference laws, which invalidated preferential payments to insiders, as described in Section 1.2.2. It is unclear whether these laws have similar effects on credit supply and demand among startups, since they target owners' discretion over making payments to insiders as they approach insolvency. While anti-insider preference laws were often passed at the same time as the first adoption of a constructive definition of fraud, this is not always the case (see Table 1.1). This permits a separate analysis of entrepreneurial activity among states adopting anti-insider preference laws relative to a control group of states that do not. We implement this test by reestimating Equation (1.1) with an independent variable that equals one if an insider preference law was passed in that state and zero otherwise.

1.4. Empirical Results

1.4.1. Effect of the UFTA on establishment entry and exit

The strengthening of creditor rights—in our context through a constructive definition of fraud—has a theoretically ambiguous effect on entrepreneurial activity in equilibrium. It may increase entrepreneurship by expanding access to credit for financially constrained entrepreneurs or slow down entrepreneurship if risk-averse business owners fear personal assets will be clawed back by creditors in the event of default. These competing hypotheses are tested in Table 1.3, where we estimate Equation (1.1) with the (log) number of total, churning, and long-term entrants, and the number of establishment closures as dependent variables.

Column [1] shows the effect of the UFTA on the total number of entering establishments at the state-year level. We see that the coefficient on *UFTA* is -0.066, which is significant at the 1 percent confidence level. The passage of the UFTA yields an economically large effect on entrepreneurship: a 6.6 percent decrease in the number of new entrants.

Columns [2] and [3] report the effect of the UFTA on the number of churning and long-term entrants, respectively. Churning entrants are entrants that close within three years of entry, whereas long-term entrants are those that survive for at least three years. The point estimates are -0.073 and -0.064 for churning and long-term entrants, respectively, and both are statistically significant at the 1 percent confidence level. In Column [4], we look at the effect of the UFTA on establishment closures. We define the year of closure to be the last year with a positive number of employees. The estimated coefficient on *UFTA* is -0.065 and continues to be statistically significant at the 1 percent confidence level. Evidently, both business creation and failure decrease following the passage of the UFTA. This indicates that the strengthening of creditor rights not only decreases new business formation but also increases the survival of old businesses. These effects are consistent with owners reducing risk-taking when their personal assets are at stake.

The results so far suggest that the passage of constructive fraud law is associated with a decrease in both establishment entry and exit rates. One potential concern with this finding is that some of these entering or exiting establishments may belong to large, incumbent firms that are not necessarily representative of entrepreneurial activity. To address this concern, we estimate Equation (1.1) separately for establishments belonging to both single- and multi-unit firms. The results of this estimation are shown in Table 1.4.

Columns [1] and [2] report the effect of adopting the UFTA on the number of entrants for single- and multi-unit firms, respectively. We see that strengthening creditor rights decreases single-unit firm entry by 9.6 percent, which is about 50 percent larger than the

baseline effect and statistically significant at the 1 percent level, whereas it has no statistically significant impact on the expansion of already existing, multi-unit firms. The remaining columns of Table 1.4 indicate that similar results emerge when we focus on other aspects of the entrepreneurial process in the wake of the law change. In each case, only the entry and exit rates of single-unit firms are affected. These results confirm that the law change only has an impact on churning among startups, which are the types of firms likely to have owners' personal and business assets commingled.

1.4.2. Dynamic analysis of entry and exit

Table 1.5 provides a nonparametric estimation of the treatment effect dynamics at the state-year level. Rather than having a single indicator variable switching on after each adoption of the UFTA, we modify Equation (1.1) to include four indicator variables: the first is for the two years before the law change, the second is for the year of the law change and the following year, the third is for the subsequent two years, and the final indicator is for the fourth and all other years after the law change. The coefficients on each of these indicator variables measure entry and exit rates relative to the corresponding rates in the period at least three years prior to the law change, which is a suitable approach given the short length of time before the first law change. For this analysis, we focus on the entry and exit rates of single-unit firms, since they better capture entrepreneurship, and we know from Table 1.5 that this is where the treatment effect is located.

Turning to the estimates in columns [1] to [4], three notable facts emerge. First, we observe that the effects of the UFTA do not show up immediately, but instead take between two and three years to materialize. The estimated effects on two and three years after the passage of the UFTA and year four and thereafter are statistically different from zero. The estimated entry rate for startups four or more years after the law change is about 9.2 percent lower than entry rates at least three years prior. We find similar effects for churning and long-term entry. Second, establishment closure rates decrease only four years out, which makes sense given that churning entry begins to wane in the second year and beyond. Third, the coefficients on all entry and exit measures are indistinguishable from zero for the two years prior to the law change, confirming that there are no preexisting trends between treated and control states.

1.4.3. Effect of the UFTA by startup capital amount

Stronger creditor rights are likely to matter more for startups in which owners' personal and business assets are commingled. For such firms, under a constructive definition of fraud,

creditors would be better positioned to recover their claims using the personal assets of the entrepreneur should the venture fail. We provide a direct test of this argument by performing sample splits according to the amount of capital required to start a new business.

Sectors requiring large, upfront investments (e.g., heavy manufacturing) have startup capital requirements that are likely too large to be met with the use of personal assets. In contrast, for owners operating in industries requiring less startup capital, pledging personal assets as collateral is likely to be feasible. We therefore sort industries on the basis of startup capital required using survey data from the CBO Survey of the 1992 Economic Census (see also Hurst and Lusardi, 2004; Adelino et al., 2015).[17] We then reestimate Equation (1.1) separately for industries with high and low needs for startup capital.

The results in Table 1.6 follow the predicted pattern. As indicated in columns [1] and [2], following the UFTA the number of startups decreases in industries that require low startup capital, whereas we see no effect in high startup capital industries. The estimated coefficient is -0.072 and is significant at the 1 percent confidence level. Columns [3] to [6] show that this effect is seen in both churning and long-term entrants. The estimated coefficients are -0.064 and -0.077 for churning and long-term entrants, respectively, and significant at the 5 percent level, at least. The remaining columns indicate that closures decrease for only low startup capital industries. Thus, the link between creditor protection and entrepreneurial activity is present only among industries with lower startup capital requirements.

1.4.4. Effect of the UFTA by initial employment

We next characterize patterns of entry and exit across the establishment size distribution. This analysis provides a more accurate description of how the passage of the UFTA slowed down entrepreneurial activity. By estimating a stricter version of Equation (1.1), it also allows us to mitigate concerns regarding unobservable state-level factors that might jointly impact both the law change and investment opportunities.

Table 1.7 reports our estimates of entry and exit rates with establishments classified according to their level of employment in the year of entry (or exit). We focus on the following size groupings: 1–5 employees, 6–20 employees, 21–100 employees, and greater than 100 employees.[18] We thus compare the establishment opening and closure rates of the two types of

[17]Based on the fraction of owners responding to the question "Total Capital Needed by Owner to Start/Acquire the Business by Industry Division" above or below $1,000,000, we classify two-digit SIC industries as having high or low startup capital need. Precisely, Manufacturing (20–39), Transportation, Communications, and Utilities (40–49), and Wholesale Trade (50–51) are classified as having high startup capital need. The remaining industries are classified as having low startup capital need: Agricultural Services, Forestry, Fishing, and Mining (01–14), Construction (15–17), Retail Trade (52–59), and Services (70–89).

[18]For establishment closures, we construct the size groups based on final number of employees, i.e., the last positive number of employees reported in LBD before the closure.

firms, single and multi-unit, at the same state of location, industry, and year. We form our estimates based on Equation (1.2), which exploits the granularity of the LBD using a state-year-industry-type unit of observation and fully saturates the model with firm type–year, state–industry–year, and state–industry–firm type fixed effects. Coefficients on the *UFTA* × *Single-Unit* indicator variable in these regressions capture the relative elasticity of startup entry to facility expansions of multi-unit firms by employment size. Naturally, if the effect of the UFTA operates through the incentives of entrepreneurs, then the slowdown in entry and exit rates should be among the smallest establishments of single-unit entrants.

Columns [1] to [4] of the table show the effect of the UFTA on the total number of entrants for different size groups. In line with our expectation, we see that the effect of the UFTA on business formation is largest among single-unit firms with an initial number of employees between one and five. The estimated coefficient is -0.036, which implies that the number of startups with between one and five employees decreases by 3.6 percent relative to the number of facility expansions of the same size by multi-unit firms in the same state, industry, and year. The point estimate is significant at the 1 percent confidence level.

Similar patterns emerge when we look at the remaining columns. Columns [5] to [8] and [9] to [12] show analogous point estimates for churning and long-term entrants of -0.050 and -0.025, respectively. Columns [13] to [16] indicate that single-unit firms with between one and five employees reduce exit rates by 4.7 percent relative to unit closures by multi-unit firms. Similar patterns do not consistently emerge among single-unit entrants with greater than five employees.

Overall, we see that only entry and exit rates among the smallest single-unit startup firms appear to be significantly affected by the adoption of the UFTA. These size-based results are consistent with the hypothesis that the strengthening of creditor rights inhibits entrepreneurial activity. Importantly, they contrast with the alternative that startup entry simply reflects changing investment opportunities at the state level that may correlate with the adoption of the UFTA.

1.4.5. Additional results and robustness checks

The results of a series of robustness tests are presented in Table 1.8. We first examine whether our results are an artifact of our modeling choices and, particularly, the definition of treated and control states. To this end, we repeat the estimation of Equation (1.1) for all firms and also single-unit (startup) firms under a number of alternative assumptions to test the sensitivity of our results.

As described in Section 3.1.2, we choose to define our treatment variable to capture vari-

ation within states undergoing the most drastic change in creditor rights. Consequently, the District of Columbia, Iowa, Kansas, and Vermont are classified as treated states during our sample period. In panel A, we first show that the basic patterns we have documented hold for each of these states individually. Thus, we are not concerned that the peculiar circumstances of one of these four states are responsible for our findings.

In panel B, we enlarge the treatment group. First, we include Indiana, which had only a limited history of case law on constructive fraud prior to the passage of new statutory constructive fraud law in 1994. The results do not change. Second, in addition to Indiana, we include Mississippi and North Carolina, which had vague preexisting statutory law on constructive fraud but nevertheless adopted the UFTA in 2006 and 1997, respectively. Our results weaken considerably in both economic and statistical significance following the inclusion of these states to the treatment group. This last finding demonstrates that our benchmark effect occurs primarily among states undergoing the most meaningful change in creditor rights.

Thus far the control group has consisted of several subgroups: never-treated states, eventually-treated states, and already-treated states. Our identifying assumption is simply that the law changes occur at random, which is equivalent to a parallel trends assumption. While we have already demonstrated that there are no preexisting differential trends among the control group, on average, there could be among one of the subgroups of control states, and this could compromise the internal validity of our estimates. In panel C, we make several modifications to the control group to examine this possibility. First, we exclude Alaska, which never passed any statutory or case law regarding constructive fraud. We see that results are not affected. Second, we exclude Colorado, Maine, and Oregon, which were treated in 1991, 1986, and 1986, respectively. These three states were treated close to the beginning of our event window. We see that the exclusion of these three states from the already-treated group does not change the significance of our results. Finally, our results are robust to the exclusion of Louisiana, which went through a period of uncertainty regarding the statutory law on constructive fraud—Louisiana passed the UFTA in 2003, but almost immediately set in motion the steps to repeal it in 2004.

Finally, we examine the importance of anti-insider preference laws to check if the slowdown in entrepreneurial activity is coincident with this regulatory change. Since they were not always passed concurrently with the first adoption of a constructive definition of fraud (see Table 1.1), we can compare establishment entry and exit rates among states adopting anti-insider preference laws relative to a control group of states that do not.

Table 1.9 presents the results of this analysis using *Insider Preferences*—an indicator variable equal to one for any state adopting anti-insider preference laws—as the independent

variable. We repeat each of the analyses presented in Tables 1.3 through 1.7 for the anti-insider states. Results in each panel confirm that anti-insider preference laws are not the driving force behind our main results. Indeed, for the various tests, we do not find a clear effect of anti-insider preferences on entrepreneurial activity. The point estimates are mostly insignificant and generally mixed in sign. This is in stark contrast to the estimates of the effect of the UFTA on establishment entry and exit rates, which a show consistently negative pattern and are statistically significant across numerous specifications.

The insignificance of the timing of insider preference laws addresses the concern that our main results may be driven by a reduction in mostly fraudulent businesses. Stricter laws that make it more difficult to pay insiders, who are typically friends or family members, should also have resulted in a reduction in business entrants. Under the assumption that fraudulent businesses are more likely to take advantage of preferential payments to insiders, the lack of evidence in this regard suggests that fraudulent business activity accounts for a minor fraction of businesses overall.

1.5. Conclusion

The passage of the UFTA brought about an important change in business law: it eliminated the burden of proof of fraudulent intent previously needed for creditors to undo transfers from failing businesses. Our evidence demonstrates that the adoption of the constructive interpretation of fraud had negative effects on entrepreneurial activity.

Using longitudinal establishment-level data from the U.S. Census Bureau, we find significant reductions in establishment entry and exit rates following the passage of the UFTA. These effects are present only among new, single-unit firms (i.e., entrepreneurs), as opposed to the expansions and contractions among larger, multi-unit firms, even within the same industry and the smallest employment size grouping, in a given state. Moreover, we find an effect of the UFTA only on startups requiring low initial levels of capital. These results point to the law change affecting the incentives of entrepreneurs beginning new ventures (or winding down existing ones) where personal assets have a higher weight both in operations and in the financing of the business.

We attribute the decrease in entrepreneurship to a reduction in demand for credit by risk-averse individuals. Affording stronger rights to creditors, while expanding the contract space, can have adverse consequences for risk-sharing. Traditional corporate finance theory, however, may attribute the decrease in entry to frictions related to nonverifiable cash flows or early liquidation. Since we cannot observe individuals' preferences for risk, we are limited

in our ability to discern between models and pin down welfare implications.

Nevertheless, the response of entrepreneurs to improvements in creditor rights is important to policymakers, especially in light of the ongoing discussion on how to reform bankruptcy law in a way that will make the system more accessible to small businesses. The results in this paper indicate that expanding laws in favor of unsecured creditors—here, allowing them to reclaim a higher fraction of assets upon business failure—can discourage startup creation and prolong the survival of old ventures. This suggests that entrepreneurs may become constrained in their ability to redeploy assets into new and potentially more productive uses, thus inhibiting the process of capital reallocation and economic efficiency.

1.6. Tables

Table 1.1 Fraudulent transfer laws by state

This table lists the effective year of fraudulent transfers and insider preference laws as well as indicates whether there is a preexisting law on fraudulent transfers before UFTA for each state. "statutory" refers to the text that is contained within the legal code of a state, whereas "case" refers to what courts within a particular state have decided as precedent. The last column equals one if the state has some case or statutory law before the adoption of UFTA defining fraud constructively. "N/A" indicates states not adopting the UFTA.

State	UFTA	Insider preferences	Statutory or case law before UFTA
AL	1990	1990	1
AK	-	-	N/A
AZ	1990	-	1
AR	1987	1987	1
CA	1986	-	1
CO	1991	1991	0
CT	1991	1991	1
DE	1996	1996	1
DC	1996	1996	0
FL	1988	1988	1
GA	2002	2002	1
HI	1985	1985	0
ID	1987	1987	1
IL	1990	1990	1
IN	1994	-	1
IA	1995	1995	0
KS	1999	1999	0
KY	-	1970	N/A
LA	1985	1985	0
ME	1986	1986	0
MD	-	-	N/A
MA	1996	1996	1
MI	1998	1998	1
MN	1987	1987	1
MS	2006	-	1
MO	1992	1992	1
MT	1991	1991	1
NE	1989	1989	1
NV	1987	1987	1
NH	1988	1988	1
NJ	1989	1989	1
NM	1989	1959	1
NY	-	-	N/A
NC	1997	1997	1
ND	1985	1943	1
OH	1990	1961	1
OK	1986	1986	0
OR	1986	1986	0
PA	-	-	N/A
RI	1986	1986	1
SD	1987	1919	1
TN	2003	2003	1
TX	1987	1987	1
UT	1988	1988	1
VT	1996	1996	0
VA	-	-	N/A
WA	1988	1988	1
WV	1986	1986	1
WI	1988	1988	1
WY	2006	-	1

Table 1.2 Summary statistics for entering establishments

This table presents Longitudinal Business Database (LBD) statistics for entrants between 1992 and 2007.

	All entering establishments			Churning entrants			Long-term entrants		
	All	Single-unit	Multi-unit	All	Single-unit	Multi-unit	All	Single-unit	Multi-unit
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Mean Annual Entry (000s)	557	463	94	191	170	21	366	293	73
Share of Entrants (Percent)		83	17	34	30	4	66	53	13
Size distribution (percent)									
1–5 Employees	70.46	76.32	41.48	76.55	79.29	54.73	67.27	74.60	37.55
6–20 Employees	21.31	18.56	34.98	17.46	16.15	27.56	23.34	19.95	37.07
21–100 Employees	6.99	4.54	19.06	5.05	3.91	14.13	7.99	4.91	20.51
100+ Employees	1.24	0.58	4.49	0.94	0.65	3.28	1.40	0.55	4.84
Sector distribution (percent)									
Manufacturing	4.73	5.02	3.37	5.02	5.17	3.88	4.58	4.92	3.22
Services	42.25	43.36	36.96	40.20	40.07	41.03	43.33	45.27	35.63
Wholesale Trade	10.42	9.43	15.13	9.44	8.99	12.94	10.93	9.70	15.80
Retail Trade	23.44	21.94	30.54	24.54	24.78	22.65	22.86	20.33	33.01
Mining	0.38	0.36	0.48	0.38	0.36	0.54	0.39	0.37	0.46
Construction	12.00	14.30	0.86	12.82	14.37	0.94	11.56	14.28	0.84
Transportation	6.78	5.54	12.66	7.59	6.23	18.04	6.34	5.13	11.03
Geographic distribution (percent)									
Northeast	17.88	18.14	16.58	17.12	17.10	17.29	18.27	18.74	16.37
South	36.67	36.25	38.73	38.18	38.09	38.91	35.88	35.19	38.67
Midwest	20.83	20.50	22.44	19.43	19.19	21.36	21.56	21.26	22.76
West	24.62	25.10	22.25	25.27	25.63	22.43	24.29	24.80	22.19

Table 1.3 Establishment entry and exit

This table presents estimates of the impact of uniform fraudulent transfer (UFTA) laws on the entry and exit of establishments. Establishment entry and exit rates are at the state-year level. Analysis is based on data from Longitudinal Business Database (LBD) for 1992 to 2007. Total entrants include establishments at their first year of positive employment. Churning entrants are defined to be entrants closing within three years of entry. Long-term entrants include entrants that did not close within three years of entry. *UFTA* is an indicator variable that equals one if the state has any case or statutory law defining fraud constructively, and zero otherwise. Estimations include state and year fixed effects. Standard errors (in parentheses) are clustered at the state level. ***, **, and * denote 1 percent, 5 percent, and 10 percent statistical significance, respectively.

Dependent variable:	*Log(Total Entrants)* [1]	*Log(Churning Entrants)* [2]	*Log(Long-Term Entrants)* [3]	*Log(Establishment Closures)* [4]
UFTA	-0.066***	-0.073***	-0.064***	-0.065***
	(0.023)	(0.023)	(0.025)	(0.016)
State fixed effects	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y
Observations	816	816	816	816

Table 1.4 Establishment entry and exit by single- versus multi-unit firms

This table presents estimates of the impact of uniform fraudulent transfer (UFTA) laws on the entry and exit of establishments based on their single- or multi-unit firm status. Single units consist of new firm creations, whereas multi units are expansions of already existing firms. Establishment entry and exit rates are at the state-year level. Analysis is based on data from Longitudinal Business Database (LBD) for 1992 to 2007. Total entrants include establishments at their first year of positive employment. Churning entrants are defined to be entrants closing within three years of entry. Long-term entrants include entrants that did not close within three years of entry. *UFTA* is an indicator variable that equals one if the state has any case or statutory law defining fraud constructively, and zero otherwise. Estimations include state and year fixed effects. Standard errors (in parentheses) are clustered at the state level. ***, **, and * denote 1 percent, 5 percent, and 10 percent statistical significance, respectively.

Dependent variable:	*Log(Total Entrants)*		*Log(Churning Entrants)*		*Log(Long-Term Entrants)*		*Log(Establishment Closures)*	
Establishment status:	Single-unit birth	Multi-unit expansion	Single-unit birth	Multi-unit expansion	Single-unit birth	Multi-unit expansion	Single-unit death	Multi-unit contraction
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
UFTA	-0.096***	-0.003	-0.098***	0.023	-0.096***	-0.013	-0.087***	-0.005
	(0.026)	(0.030)	(0.024)	(0.030)	(0.030)	(0.035)	(0.015)	(0.034)
State fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Observations	816	816	816	816	816	816	816	816

Table 1.5 Dynamics of estimated effects

This table presents dynamic estimates of the impact of uniform fraudulent transfer (UFTA) laws on the entry and exit of single-unit firms. Single-unit firms consist of new firm creations. Establishment entry and exit rates are at the state-year level. Analysis is based on data from Longitudinal Business Database (LBD) for 1992 to 2007. The independent variables indicate the timing relative to the passage of UFTA laws in each state. Total entrants include establishments at their first year of positive employment. Churning entrants are defined to be entrants closing within three years of entry. Long-term entrants include entrants that did not close within three years of entry. *UFTA* is an indicator variable that equals one if the state has any case or statutory law defining fraud constructively, and zero otherwise. Estimations include state and year fixed effects. Standard errors (in parentheses) are clustered at the state level. ***, **, and * denote 1 percent, 5 percent, and 10 percent statistical significance, respectively.

Dependent variable:	*Log(Total Entrants)*	*Log(Churning Entrants)*	*Log(Long-Term Entrants)*	*Log(Establishment Closures)*
	[1]	[2]	[3]	[4]
UFTA × *Year(-2, -1)*	-0.016	-0.023	-0.012	0.026
	(0.016)	(0.016)	(0.019)	(0.021)
UFTA × *Year(0, 1)*	0.009	-0.013	0.014	0.012
	(0.033)	(0.028)	(0.059)	(0.018)
UFTA × *Year(2, 3)*	-0.080***	-0.089***	-0.076***	-0.086
	(0.020)	(0.028)	(0.017)	(0.053)
UFTA × *Year(4+)*	-0.092***	-0.113***	-0.083***	-0.058**
	(0.033)	(0.030)	(0.036)	(0.028)
State fixed effects	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y
Observations	816	816	816	816

Table 1.6 Effects by startup capital amount

This table presents estimates of the impact of uniform fraudulent transfer (UFTA) laws on the entry and exit of single-unit firms based on their dependence on startup capital. We differentiate between industries that require high vs. low startup capital based on the survey response to the question "Total Capital Needed by Owner to Start/Acquire the Business by Industry Division" in the 1992 Characteristics of Business Owners (CBO) Survey. We split industries according to whether they have below ("Small") or above ("Large") median percent of firms requiring startup capital of $1,000,000 or more. Industries and their corresponding percent of firms relying on startup capital of $1,000,000 or more. Establishment entry and exit rates are at the state-year level. Analysis is based on data from Longitudinal Business Database (LBD) for 1992 to 2007. Total entrants include establishments at their first year of positive employment. Churning entrants are defined to be entrants closing within three years of entry. Long-term entrants include entrants that did not close within three years of entry. *UFTA* is an indicator variable that equals one if the state has any case or statutory law defining fraud constructively, and zero otherwise. Estimations include state and year fixed effects. Standard errors (in parentheses) are clustered at the state level. ***, **, and * denote 1 percent, 5 percent, and 10 percent statistical significance, respectively.

Dependent variable:	*Log(Total Entrants)*		*Log(Churning Entrants)*		*Log(Long-Term Entrants)*		*Log(Establishment Closures)*	
Startup capital amount:	Small	Large	Small	Large	Small	Large	Small	Large
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
UFTA	-0.072***	0.053	-0.064**	0.019	-0.077***	0.064	-0.072***	-0.022
	(0.033)	(0.070)	(0.028)	(0.063)	(0.035)	(0.079)	(0.018)	(0.017)
State fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Observations	816	816	816	816	816	816	816	816

Table 1.7 Effects by firms' initial employment

This table presents estimates of the impact of uniform fraudulent transfer (UFTA) laws on the entry and exit of firms based on their initial number of employees for total, churning, and long-term entrants and final number of employees for closures. Establishment entry and exit rates are at the state-year level. Analysis is based on data from Longitudinal Business Database (LBD) for 1992 to 2007. Total entrants include establishments at their first year of positive employment. Churning entrants are defined to be entrants closing within three years of entry. Long-term entrants include entrants that did not close within three years of entry. *UFTA* is an indicator variable that equals one if the state has any case or statutory law defining fraud constructively, and zero otherwise. In addition to state and year fixed effects, estimations include type fixed effects indicating whether the firm is single-unit or multi-unit. Standard errors (in parentheses) are clustered at the state level. ***, **, and * denote 1 percent, 5 percent, and 10 percent statistical significance, respectively.

Dependent variable:	*Log(Total Entrants)*				*Log(Churning Entrants)*			
Initial employment:	1-5	6-20	21-100	101+	1-5	6-20	21-100	101+
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
UFTA × *SU*	-0.036***	0.000	0.001	-0.015*	-0.050***	0.002	-0.006	-0.015***
	(0.012)	(0.017)	(0.020)	(0.008)	(0.016)	(0.011)	(0.013)	(0.005)
State-ind.-type	Y	Y	Y	Y	Y	Y	Y	Y
State-ind.-year	Y	Y	Y	Y	Y	Y	Y	Y
Type-year	Y	Y	Y	Y	Y	Y	Y	Y
Observations	109,344	109,344	109,344	109,344	109,344	109,344	109,344	109,344

Dependent variable:	*Log(Long-Term Entrants)*				*Log(Establishment Closures)*			
Initial employment:	1-5	6-20	21-100	101+	1-5	6-20	21-100	101+
	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]
UFTA × *SU*	-0.025**	-0.007	0.001	-0.005	-0.047***	-0.004	0.000	-0.002
	(0.011)	(0.023)	(0.014)	(0.012)	(0.015)	(0.020)	(0.009)	(0.014)
State-ind.-type	Y	Y	Y	Y	Y	Y	Y	Y
State-ind.-year	Y	Y	Y	Y	Y	Y	Y	Y
Type-year	Y	Y	Y	Y	Y	Y	Y	Y
Observations	109,344	109,344	109,344	109,344	109,344	109,344	109,344	109,344

Table 1.8 Additional results and robustness checks

This table presents additional estimates of the impact of uniform fraudulent transfer (UFTA) laws on the entry and exit of establishments. Each cell corresponds to a separate regression and shows the coefficient of interest, β, from Equation (1). Panel A shows the estimates for each treated state separately. Panel B considers alternative treatment classifications based on states with partial law changes. Panel C considers restricted untreated groups. Establishment entry and exit rates are at the state-year level. Analysis is based on data from Longitudinal Business Database (LBD) for 1992 to 2007. Total entrants include establishments at their first year of positive employment. Churning entrants are defined to be entrants closing within three years of entry. Long-term entrants include entrants that did not close within three years of entry. *UFTA* is an indicator variable that equals one if the state has any case or statutory law defining fraud constructively, and zero otherwise. Estimations include state and year fixed effects. Standard errors (in parentheses) are clustered at the state level. ***, **, and * denote 1 percent, 5 percent, and 10 percent statistical significance, respectively.

Dependent variable:		*Log(Total Entrants)*		*Log(Churning Entrants)*		*Log(Long-Term Entrants)*		*Log(Establishment Closures)*	
Establishment status:	N	All	Single-Unit	All	Single-Unit	All	Single-Unit	All	Single-Unit
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Panel A. State-by-state estimates									
DC	768	-0.014	-0.082***	-0.058*	-0.122***	0.005	-0.062***	-0.062***	-0.113***
		(0.019)	(0.023)	(0.035)	(0.027)	(0.013)	(0.023)	(0.015)	(0.013)
IA	768	-0.127***	-0.217***	-0.163***	-0.202***	-0.110***	-0.227***	-0.084***	-0.104***
		(0.013)	(0.049)	(0.029)	(0.044)	(0.013)	(0.053)	(0.011)	(0.010)
KS	768	-0.083***	-0.113***	-0.070***	-0.090***	-0.092***	-0.127***	-0.040***	-0.064***
		(0.012)	(0.020)	(0.015)	(0.017)	(0.012)	(0.023)	(0.011)	(0.011)
VT	768	-0.055***	-0.085***	-0.069***	-0.071***	-0.049*	-0.094***	-0.099***	-0.101***
		(0.022)	(0.017)	(0.016)	(0.014)	(0.025)	(0.023)	(0.010)	(0.013)
Panel B. Alternative treatment classification									
Partial law change (inc. IN)	816	-0.066***	-0.098***	-0.069***	-0.095***	-0.066***	-0.101***	-0.056***	-0.077***
		(0.021)	(0.024)	(0.021)	(0.022)	(0.023)	(0.027)	(0.017)	(0.017)
Partial law change (inc. IN, MS, NC)	816	-0.041	-0.061*	-0.045	0.061*	-0.040	-0.062*	-0.029	-0.045
		(0.031)	(0.034)	(0.034)	(0.036)	(0.030)	(0.034)	(0.033)	(0.035)
Panel C. Restrict control group									
Exclude never treated (AK)	800	-0.065***	-0.083***	-0.065***	-0.088***	-0.066**	-0.080***	-0.065***	-0.084***
		(0.025)	(0.021)	(0.024)	(0.019)	(0.027)	(0.023)	(0.017)	(0.015)
Exclude recently treated (CO)	800	-0.065***	-0.095***	-0.072***	0.097***	-0.063***	-0.095***	-0.063***	-0.085***
		(0.023)	(0.026)	(0.023)	(0.024)	(0.025)	(0.030)	(0.016)	(0.015)
Exclude recently treated (CO, ME, OR)	768	-0.064***	-0.094***	-0.072***	-0.096***	-0.062**	-0.094***	-0.063***	-0.084***
		(0.024)	(0.027)	(0.024)	(0.025)	(0.026)	(0.030)	(0.017)	(0.016)
Exclude repeal (LA)	800	-0.068***	-0.098***	-0.075***	-0.100***	-0.066***	-0.098***	-0.066***	-0.088***
		(0.023)	(0.026)	(0.023)	(0.024)	(0.025)	(0.030)	(0.017)	(0.015)

Table 1.9 Passage of insider preference laws

This table presents estimates of the impact of insider preference laws on entrepreneurship. Panel A presents estimates of the impact of insider laws on the entry and exit of establishments. Panel B shows establishment entry and exit rates based on their single- or multi-unit firm status. Panel C presents the dynamic estimates. Panel D analyzes the impact of insider preference laws on firms based on their initial number of employees. Establishment entry and exit rates are at the state-year level. Analysis is based on data from Longitudinal Business Database (LBD) for 1992 to 2007. Total entrants include establishments at their first year of positive employment. Churning entrants are defined to be entrants closing within three years of entry. Long-term entrants include entrants that did not close within three years of entry. *Insider Preferences* is an indicator variable that equals one if the state has adopted any anti-insider preferences laws, and zero otherwise. Estimations include state and year fixed effects. Standard errors (in parentheses) are clustered at the state level. ***, **, and * denote 1 percent, 5 percent, and 10 percent statistical significance, respectively.

Panel A. Baseline estimates				
Dependent variable:	*Log(Total Entrants)*	*Log(Churning Entrants)*	*Log(Long-Term Entrants)*	*Log(Establishment Closures)*
	[1]	[2]	[3]	[4]
Insider Preferences	-0.028	0.067*	0.008	0.033
	(0.032)	(0.038)	(0.033)	(0.022)
State fixed effects	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y
Observations	752	752	752	752

Table 1.9 (con't.)

Panel B. Effect by single- or multi-unit status								
Dependent variable:	*Log(Total Entrants)*		*Log(Churning Entrants)*		*Log(Long-Term Entrants)*		*Log(Establishment Closures)*	
	SU Birth	MU Expansion	SU Birth	MU Expansion	SU Birth	MU Expansion	SU Death	MU Contraction
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Insider Preferences	0.032	-0.028	0.073*	-0.013	0.009	-0.032	0.034	0.020
	(0.037)	(0.029)	(0.043)	(0.031)	(0.037)	(0.031)	(0.023)	(0.036)
State fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Observations	752	752	752	752	752	752	752	752

Table 1.9 (con't.)

Panel C. Dynamic effects				
Dependent variable:	*Log(Total Entrants)*	*Log(Churning Entrants)*	*Log(Long-Term Entrants)*	*Log(Establishment Closures)*
	[1]	[2]	[3]	[4]
Insider Preferences × Year(-2, -1)	-0.012	-0.034	0.006	-0.008
	(0.028)	(0.042)	(0.019)	(0.025)
Insider Preferences × Year(0, 1)	0.034***	0.009	0.054***	0.011
	(0.011)	(0.012)	(0.013)	(0.013)
Insider Preferences × Year(2, 3)	-0.013	0.024	-0.034	0.000
	(0.029)	(0.024)	(0.040)	(0.031)
Insider Preferences × Year(4+)	-0.016	0.031	-0.045*	0.020
	(0.023)	(0.031)	(0.027)	(0.021)
State fixed effects	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y
Observations	752	752	752	752

Panel D.I. Effect by initial employment								
Dependent variable:	*Log(Total Entrants)*				*Log(Churning Entrants)*			
Initial employment:	1-5	6-20	21-100	101+	1-5	6-20	21-100	101+
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Insider × SU	-0.006	0.006	0.042***	0.019	0.010	0.020	0.034*	0.015
	(0.012)	(0.025)	(0.019)	(0.020)	(0.016)	(0.022)	(0.019)	(0.013)
State-industry-type	Y	Y	Y	Y	Y	Y	Y	Y
State-industry-year	Y	Y	Y	Y	Y	Y	Y	Y
Type-year	Y	Y	Y	Y	Y	Y	Y	Y
Observations	100,768	100,768	100,768	100,768	100,768	100,768	100,768	100,768

Panel D.II. Effect by initial employment								
Dependent variable:	*Log(Long-Term Entrants)*				*Log(Establishment Closures)*			
Initial employment:	1-5	6-20	21-100	101+	1-5	6-20	21-100	101+
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Insider Pref. × SU	-0.012	0.003	0.036*	0.004	-0.022	-0.015	0.004	-0.013
	(0.011)	(0.023)	(0.02)	(0.015)	(0.015)	(0.017)	(0.024)	(0.018)
State-industry-type	Y	Y	Y	Y	Y	Y	Y	Y
State-industry-year	Y	Y	Y	Y	Y	Y	Y	Y
Type-year	Y	Y	Y	Y	Y	Y	Y	Y
Observations	100,768	100,768	100,768	100,768	100,768	100,768	100,768	100,768

CHAPTER 2

CREDITOR RIGHTS, TECHNOLOGY ADOPTION, AND PRODUCTIVITY: PLANT-LEVEL EVIDENCE

2.1. Introduction

There is an influential body of research arguing that financial and legal institutions affect economic growth (La Porta et al., 1997; King and Levine, 1993; Rajan and Zingales, 1998); however, much less is known about the specific channel. The effect of these institutions on financing constraints, technology adoption, and productivity is a possible explanation (Hicks, 1969).[1] The purpose of this study is to investigate the importance of the rights of secured creditors in bankruptcy for the productivity of businesses.

On the theoretical front, the effect of creditor rights on productivity is far from obvious. On the one hand, stronger creditor rights, such as an increased ability to recover collateral in the event of financial distress, might encourage lending. The relaxation in borrowing constraints might lead to higher technology adoption by firms, which will help them operate more efficiently (Midrigan and Xu, 2014). On the other hand, stronger creditor rights may increase the costs of financial distress for firms and managers, leading them to avoid risky but innovative projects, which can be detrimental to the productive efficiency (Acharya and Subramanian, 2009; Acharya et al., 2011).

Endogeneity greatly hinders any attempt to study the effect of creditor rights on productivity. For example, there might be a variety of unobservable factors affecting both creditor rights in a country or a state and the performance of firms. To overcome this obstacle, I use enactment of anti-recharacterization statutes as a source of exogenous variation in creditor rights (e.g., Li et al., 2016). These laws mainly affect the securitization industry and firms using a special-purpose vehicle (SPV) to conduct secured borrowing. Collateral is transferred to an SPV for the purpose of protecting it from automatic stay in case of the bankruptcy of the debtor. However, before these laws, bankruptcy judges had the discretion to make the

[1]Productivity shocks have been modeled as an important driver of economic fluctuations in a variety of macroeconomic models, beginning with Kydland and Prescott (1982). Moreover, Klenow and Rodriguez-Clare (1997) and Hall and Jones (1999) argue that differences in productivity are critical to understanding output differences between countries.

collateral in the SPV subject to automatic stay. These laws significantly increased the rights of secured creditors in bankruptcy by denying judges this discretion and allowing secured creditors to seize the collateral in the SPV.[2]

I adapt the empirical methodology of Bertrand and Mullainathan (2003) to study the effect of anti-recharacterization laws based on plant-level data from the U.S. Census Bureau. The granularity of the Census data coupled with the fact that anti-recharacterization laws were adapted at the state of incorporation level helps me conduct two types of analysis. First, the Census data provide the exact geographic location and industry of each plant, which allows me to compare the change in productivity of two plants in the same year, industry, and location. To illustrate, I am able to compare the productivity change of two plants in Iowa, one of which belongs to a firm incorporated in Texas (a treated state), and the other which belongs to a firm incorporated in California (a control state). This plant-level analysis allows me to observe the productive efficiency of a plant far from the state of headquarters or state of incorporation, and separately identify the effect of stronger creditor rights from local economic shocks contemporaneous with the laws. Second, the longitudinal nature of the plant-level data helps me observe the productivity of a plant for several consecutive years, which is crucial in the context of my study given that effects on productivity may take time to materialize.

Following the adoption of anti-recharacterization laws, total factor productivity of plants belonging to treated firms increases significantly, by 2.6 percent. In addition to total factor productivity, capital and labor productivities increase. The fact that these laws are passed by states and are not driven by firm-specific conditions alleviates the concern of endogeneity. However, the possibility that these laws are passed in response to changing economic conditions needs to be addressed. I conduct two tests to address this concern. First, I conduct a dynamic analysis and show insignificant effects before the passage of these laws. Second, I conduct a placebo test, falsely assuming that neighboring states are treated. If my estimates are simply picking up economic shocks near the geography of Texas, Louisiana, and Alabama, then I should be able to see significant effects for neighboring states as well. Estimates from this falsification test are statistically indistinguishable from zero, which shows that the effect on productivity is coming only from states that enacted these laws.

In the second part of my empirical analysis, I try to uncover the channel through which stronger creditor rights translate into increasing productive efficiency. First, I demonstrate

[2]There are a substantial number of firms using SPVs. Using 6,473 public firms between 1997 and 2004, Feng et al. (2009) find that on average 42 percent of firms use at least one SPV. In 2004, 59 percent of firms report at least one SPV, which shows that their use is quite prevalent. Furthermore, Korgaonkar and Nini (2010) state that firms in manufacturing and production of consumer durables use special-purpose vehicles intensively.

that the increase in productivity is related to financial constraints: plants belonging to financially constrained firms show substantial increase in productivity, whereas I do not see any significant change in the productivity of plants belonging to unconstrained firms. Second, the disaggregated nature of the Census data allows me to document two important changes in the composition of investments that are motivated by the literature on financial constraints and investment. I show that treated plants adopt more advanced technology by investing in capital of younger vintage and newer technology: new machinery and computer investments increase significantly at treated plants. Consistent with Eisfeldt and Rampini (2007), who show that investing in used capital rather than new capital is more common among credit-constrained firms, I document that the fraction of capital expenditures on new machinery increases significantly at treated plants.[3] Furthermore, as argued by Garmaise (2008), constrained firms are much more labor-intensive in their production process. Therefore, a relaxation of borrowing constraints should be accompanied with a shift to a more capital-intensive production. To test this theory, I examine how new machinery scaled by labor changes at treated plants and find that new machinery expenditures per unit of labor increase significantly at treated plants. This compositional change indicates that the production at treated plants is becoming more capital-intensive.

My findings are related to at least two strands of literature. First, I contribute to the literature on creditor rights and their effects on firms. Strengthening of creditor rights can result in inefficient liquidation of firms by increasing the cost of continuing during financial distress (Aghion and Bolton, 1992; Hart et al., 1997). This liquidation bias can lead firms to pursue more conservative financing and investment policies ex ante. Vig (2013) analyzes the effects of a securitization reform in India on the debt structure of firms. He shows that following a 2002 law that strengthened the rights of secured creditors, firms use less secured debt and hoard more cash, which are indicative of a more conservative financing policy. Acharya and Subramanian (2009), Acharya et al. (2011), Berger et al. (2011), and Seifert and Gonenc (2012) present evidence consistent with this view, showing that stronger creditor rights are associated with less innovation, as well as more conservative investment and financing policies. A more recent set of studies shows effects contrary to the liquidation bias. Li et al. (2016) show that firms increase leverage significantly following the adoption of anti-recharacterization laws. Favara et al. (2017) argue that strengthening of creditor rights following these laws affects firms' investment and financing policies by making them more

[3]Using data from the Annual Capital Expenditure Survey (ACES) conducted by the U.S. Census Bureau, Eisfeldt and Rampini (2007) show that the fraction of capital expenditures on used capital is 27.79 percent for firms in the lowest size decile, with assets below $0.10 million, and 10.10 percent for firms in the highest asset decile, with assets above $186.55 million. Using other measures of credit constraints, they report that this fraction increases significantly as firms become more constrained.

resilient to uncertainty shocks. Using the same laws as well as additional court decisions, Mann (2015) documents that firms increase their debt, as well as their innovation output. Cerqueiro et al. (2016) look at increases in U.S. state-level bankruptcy exemption limits as a source of variation in creditor rights and report that the number and quality of patents produced by small firms decrease significantly. Finally, using a bankruptcy reform increasing the rights of secured creditors in Brazil, Ponticelli and Alencar (2016) argue that efficient judicial courts increase firm investment and growth.

Second, my study contributes to the literature analyzing the effects of finance on productivity and performance. Butler and Cornaggia (2011) analyze the effects of ethanol-induced change in demand on the productivity of farmers. They find that farmer productivity increases significantly more in areas with high levels of bank deposits. Gatti and Love (2008) and Levine and Warusawitharana (2016) show that increased access to finance is associated with total factor productivity (TFP) growth in a sample of Bulgarian and European firms, respectively. A recent study by Cerqueiro et al. (2016) investigates the effects of a legal reform in Sweden that reduces the collateral value. They show that the productive efficiency of treated firms does not change. The closest study to my study is Krishnan et al. (2014). By using Census data, they show that TFP increases following interstate banking deregulations among the smallest firms in the economy. I complement their study in the following four ways. First, the natural experiment I am using provides a different source of increased access to finance for treated firms. Interstate banking deregulations used by Krishnan et al. (2014) result in increased access to finance through increased bank competition, whereas anti-recharacterization laws allow increased access to finance through shifting the balance of power toward a broader set of creditors. Second, I exploit the granularity of the Census data to compare two plants in the same state, industry, and year, but with different states of incorporation, which provides a very clean identification. Third, I show that the move to a newer and more capital-intensive production technology following a relaxation of borrowing constraints is the channel behind the increase in productivity. Finally, I show that public firms' productivity also is affected increased access to finance.

2.2. Anti-Recharacterization Laws

I begin by describing anti-recharacterization laws that affect the securitization industry and firms using a special-purpose vehicle (SPV) to conduct secured borrowing. Collateral is transferred to an SPV, which is a financial intermediary designed to be bankruptcy-remote, then sold to investors as securities. The main reason for transferring assets to a different

entity is to characterize them as sales, thereby protecting them from automatic stay in case of bankruptcy of the issuing firm. The bankruptcy-remoteness of an SPV is intended to assure investors that obligations will be fulfilled even if the SPV originating firm goes bankrupt. However, the bankruptcy-remoteness of an SPV should not be taken for granted. Sometimes bankruptcy courts can recharacterize the asset transfer as a secured loan rather than as a true sale, making the SPV assets subject to automatic stay. Such discretion of bankruptcy courts is generally justified by stating that the SPV will play an important role in the reorganization of the bankrupt firm. The enactment of anti-recharacterization laws discards the possibility of recharacterization by bankruptcy courts.

These laws were enacted in seven states: Texas and Louisiana in 1997, Alabama in 2001, Delaware in 2002, South Dakota in 2003, Virginia in 2004, and Nevada in 2005. Kettering (2011) states that these seven states can be divided into two groups in terms of the coverage of their anti-recharacterization laws. In Texas and Louisiana, Section 9.109 of the Uniform Commercial Code (U.C.C.) discards the possibility of recharacterization for all sales of receivables, whereas in the other states, the possibility of recharacterization is prevented only for sales under a securitization transaction.[4]

A deeper look at these anti-recharacterization laws shows that these laws affect a substantial number of transactions. Section 9.109 of the Texas and Louisiana Uniform Commercial Code (U.C.C.) explicitly discards the possibility of recharacterization of the sale of the following four items: accounts, chattel paper, payment intangibles, and promissory notes.[5] The most important item for the purposes of my study is accounts, defined in Section 9.102 of the Uniform Commercial Code (U.C.C.). "Accounts" means a right to payment of a monetary obligation, whether or not earned by performance, for a variety of items, including (i) property that has been or is to be sold, leased, licensed, assigned, or otherwise disposed of; (ii) services rendered or to be rendered; (iii) a policy of insurance; (iv) licensing of intellectual property; and (v) credit cards. As can be seen, this definition of accounts goes beyond the traditional definition of accounts consisting mainly of trade receivables.

In Alabama, which constitutes my third treatment state, and the remaining four states,

[4]Appendix B.2 gives the section of the state statutes that guarantees anti-recharacterization for Texas, Louisiana, and Alabama, which constitute my treatment states.

[5]Part of Section 9.109 of the Texas and Louisiana Uniform Commercial Code (U.C.C.) that explicitly discards the recharacterization: "The application of this chapter to the sale of accounts, chattel paper, payment intangibles, or promissory notes is not to recharacterize that sale as a transaction to secure indebtedness but to protect purchasers of those assets by providing a notice filing system. For all purposes, in the absence of fraud or intentional misrepresentation, the parties' characterization of a transaction as a sale of such assets shall be conclusive that the transaction is a sale and is not a secured transaction and that title, legal and equitable, has passed to the party characterized as the purchaser of those assets regardless of whether the secured party has any recourse against the debtor, whether the debtor is entitled to any surplus, or any other term of the parties' agreement."

anti-recharacterization is guaranteed by an act that precludes recharacterization of a sale of property of any kind included in a securitization transaction. In Appendix B.2, as can be seen in Section 35-10A-2 of the Code of Alabama, no property, assets, or rights transferred to an SPV can be subject to recharacterization. Assets typically transferred to an SPV include trade receivables, residential and commercial loans, equipment leases, licenses, and management contracts.

Taken together, these laws increase the pledgeability of any rights to future payment, receivables, by making them more accessible to creditors. Manufacturing firms, which constitute my sample, in particular generate a large amount of receivables. Korgaonkar and Nini (2010) state that firms involved in the manufacturing and production of consumer durables are heavy users of SPVs. For this reason, I expect these anti-recharacterization laws to have a significant effect on manufacturing firms.

The use of securitization is not confined to manufacturing firms. Feng et al. (2009) document that the percentage of firms using at least one SPV increased from 23 percent in 1997 to 59 percent in 2004, which confirms how common they became in the time period my sample covers. Finally, these laws are fairly exogenous to the firms included in my sample. Kettering (2008) describes the enactment of anti-recharacterization laws as a great success of the securitization industry. Janger (2003) constitutes another study arguing for the big role played by the financial industry in the enactment of anti-recharacterization laws. I will return to the endogeneity concern due to lobbying by industrial firms in Section 2.4.1.1.

2.3. Data and Empirical Methodology

I adapt the empirical methodology of Bertrand and Mullainathan (2003) in the sample construction and the plant-level analysis. In this section, I describe each step in detail.

2.3.1. Data Sources

The main data I use in this study is a combination of two data sets from the Census. Both data sets cover only U.S. manufacturing plants. The first manufacturing plant data set is the Census of Manufacturers (CMF). The CMF is conducted every five years and consists of all manufacturing plants in the United States with at least one paid employee. The second manufacturing data set is the Annual Survey of Manufacturers (ASM). The ASM is conducted in years when the CMF is not conducted and includes a subset of plants surveyed in the CMF. Plants with 250 employees and above are always included in this sample, whereas plants with a smaller number of employees are chosen randomly, with a

probability positively correlated with their number of employees. Both of these data sets include detailed information on industry, corporate affiliation, total shipments, employment, capital expenditures, and material inputs of each plant. Reporting for both of these surveys is mandatory and misreporting is penalized, which alleviates misreporting and response rate concerns. The level of granularity of these manufacturing data sets plays a critical role in my analysis. First, it allows me to construct various measures of productivity for each manufacturing plant, and thereby analyze how the productivity of a plant and the creditor rights are related. Second, it helps me study how the vintage of productive assets as well as the capital-labor ratio are affected by providing granular and reliable machinery, computer, and employment numbers.

In addition to these two manufacturing data sets, I use another data set from the Census, the Longitudinal Business Database (LBD). The LBD keeps yearly track of all business establishments in the United States with at least one paid employee. It provides information on the number of employees, payroll, geographical location, industry, and corporate affiliation for each establishment. For the purpose of this study, I use the LBD to get information about the age of the plant as well as the number of plants owned by the firm the plant belongs to.

Finally, I use firm-level data from Compustat. I confine my analysis to public firms because I can observe the state of incorporation only for public firms. I use the Compustat bridge maintained by the Census to match firms in Compustat to plants. However, this bridge ends in 2005. I extend the bridge to 2009 by making use of various employer characteristics, including name, address, and identification number (EIN). My sample covers the period from 1992 to 2009.

2.3.2. Variable Construction and Summary Statistics

I follow Li et al. (2016) in the construction of the anti-recharacterization treatment variable, which constitutes the main independent variable in this study. The anti-recharacterization laws were enacted in seven states: Texas and Louisiana in 1997, Alabama in 2001, Delaware in 2002, South Dakota in 2003, Virginia in 2004, and Nevada in 2005. However, the 2003 federal court ruling on *Reaves Brokerage Company, Inc. vs. Sunbelt Fruit & Vegetable Company, Inc.* significantly harmed the influence of these laws by creating a precedent that anti-recharacterization laws could be overruled by federal courts. For this reason, I only include Texas, Louisiana, and Alabama in the set of treated states.

Following Li et al. (2016), I consider firms incorporated in Texas, Louisiana, and Alabama between 1997 and 2003 as treated firms. I also include firms whose headquarters are in those states between 1997 and 2001 in the set of treated firms. The question of which state law

will govern recharacterization is quite complicated.[6] Article 9 of the Uniform Commercial Code (U.C.C.) specifies the rules governing secured transactions, including securitization. A revised version of Article 9, effective as of July 2001, states that the law governing a secured party's interest in receivables is the law of the location of the debtor, which is defined to be the state in which the entity is registered. For corporations, this definition of location of debtor means the state of incorporation. However, the old version of Article 9, effective before June 2001, deemed the debtor's location to be the location of its chief executive office, which is the headquarters. The official comment to this older version of Article 9 explicitly states that the chief executive office does not mean the place of incorporation but is the place from which the debtor manages the main part of his business operations. Therefore, before 2001, the state of headquarters needs to be taken into account.[7]

The main dependent variable I use in this study is the natural logarithm of total factor productivity (TFP), which I am constructing at the plant level following the methodology in Foster et al. (2014).

$$TFP_{it} = \ln Q_{it} - \alpha_{kt} \ln K_{it} - \alpha_{lt} \ln L_{it} - \alpha_{mt} \ln M_{it}, \tag{2.1}$$

where i and t index plant and year, respectively. The variables TFP, Q, K, L, M, and α represent total factor productivity, real output, capital stock, labor input, cost of materials and parts, and factor elasticities, respectively.[8] Output is constructed by summing the total value of shipments and change in inventories for finished goods and work-in-process. Because the Census does not collect establishment-level prices, I use an industry-level measure from the NBER-CES Manufacturing Industry Database to deflate output.

A perpetual inventory method is used to construct capital stock that consists of structure and equipment belonging to the plant. The first year a plant is seen in the CMF/ASM is taken as a starting point to construct capital stock series. Capital expenditures using investment price deflators from the Bureau of Labor Statistics (BLS) at the two-digit SIC or three-digit NAICS level are added to the capital stock each year. An industry-level depreciation rate from the Bureau of Economic Analysis is used. Capital stock series are constructed for structure and equipment separately. They are then added to represent the total capital stock owned by the plant. Following Brav et al. (2015), I use "production-worker equivalent hours" as my measure of labor input. This measure is constructed by multiplying number of hours worked by production workers with the ratio of total wages and salaries to total wages and salaries paid to production workers. Materials costs include both non-

[6] See Kettering (2011) for an extensive analysis of the choice of law governing recharacterization.

[7] See Appendix B.2 for the choice of law rules specified in both old and new versions of Article 9.

[8] See Foster et al. (2014) for a more detailed explanation of how each variable is constructed.

energy and energy-related costs. Non-energy materials costs include costs of materials and parts as well as cost of resales and contract work. Energy costs include electricity and fuel costs. Both types of costs are deflated by their corresponding industry deflators. Finally, following Syverson (2011) and Foster et al. (2014), I use industry-level factor cost shares for factor elasticities. I get the industry-level cost shares for capital, labor, materials, and energy expenditures from the NBER Productivity Database.

In addition to total factor productivity, I analyze the effects of stronger creditor rights on factor productivities, including labor and capital productivities. I use the measure of labor productivity used in Brav et al. (2015) and Silva (2013): the natural logarithm of value added per labor hour, which is the total value of shipments minus material and energy costs divided by total labor hours. As to capital productivity, I follow Giroud and Mueller (2015)- and use return on capital (ROC), which is calculated as the total value of shipments minus labor, material, and energy costs scaled by capital stock. All inputs are measured in 1997 dollars.

In the second part of the empirical analysis, where I try to uncover the determinants of increased productivity, I use two variables: new machinery investment and computer investment. New machinery investment is constructed by scaling new machinery expenditures by lagged capital stock. Following Brav et al. (2015), I use the capital expenditures for computers variable from the CMF and ASM databases and scale it by lagged capital stock to represent investment in information technology (IT). Specifically, capital expenditures for computers includes computer hardware, software, and network expenditures. I have this variable starting with 2000.

Futhermore, I examine how new machinery expenditures scaled by labor change following the enactment of anti-recharacterization laws. To ensure the robustness of my findings, I use four different variables to represent labor. First, I use *total payroll* to represent the aggregate amount of wages and salaries. Second, I use *production payroll* to represent the amount of wages and salaries paid to production workers. Third, I use *employees* to represent the number of employees. Finally, I use *total hours* to represent the number of hours worked at the plant. I winsorize all variables at 1 percent to ensure that the results are robust to outliers.

Table 2.1 presents summary statistics for the aggregate sample as well as the subsample of plant-year observations treated by anti-recharacterization laws.[9] The final sample contains 220,000 plant-year observations covering the period between 1992 and 2009. As seen, the subsample of treated plants accounts for a relatively small fraction of the total plant-year

[9]Following the disclosure requirements of the Census, quantile values are not reported; I round off number of observations in each table.

observations. However, the treated subsample nearing 10,000 plant-year observations is sufficient, given that the treatment effect requires only that the treated subsample be sufficiently large in absolute terms, as argued in Giroud (2013). Untreated plants are older and bigger, which constitutes one of the main reasons why I include age of plants and their total value of shipments to control for differences between treated and untreated plants.

2.3.3. Identification and Empirical Model

I closely follow Bertrand and Mullainathan (2003) in my empirical strategy. The only difference is that, in my setting, not only the state of incorporation but also the state of headquarters plays a role. In the first part of my empirical analysis, I estimate the following equation:

$$y_{ifhklst} = \alpha_{lst} + \alpha_i + \alpha_h + \alpha_k + \gamma\ X_{ifhklst} + \delta\ ARL_{hkt} + \epsilon_{ifhklst}, \tag{2.2}$$

where i, f, h, k, l, s, and t index plant, firm, state of headquarters, state of incorporation, state of location, industry, and year, respectively. The unit of observation is a plant-year. The variable y stands for variables related to productivity and investment: total factor productivity (TFP), labor productivity, return on capital, new machinery investment, and computer investment. ARL_{hkt} is an indicator variable that equals one if the plant belongs to a firm whose state of headquarters or state of incorporation passed an anti-recharacterization law (ARL) within the past three years (t, t-*1*, and t-*2*). Following Bai (2016), I take the last three years into account given that the effect of these laws on productivity may take longer to materialize. α_{lst}, α_i, α_h, and α_k are state of location-industry-year, plant, state of headquarters, and state of incorporation fixed effects, respectively. $X_{ifhklst}$ stands for plant and firm controls: total value of shipments, age of the plant, and number of plants owned by the firm the plant belongs to. *Age* is defined based on the first year the plant is first seen in LBD records. *Industry* is defined at the two-digit SIC level. Following Bertrand and Mullainathan (2003), I cluster standard errors at the state of location level.[10]

Because of the 2003 federal court ruling, I adopt an "on-off" approach in my estimation strategy, following Li et al. (2016) and Chu (2017). According to this approach, the "on" period includes years after a state passes anti-recharacterization laws but before 2004. I do not include 2004 and the following years because of the 2003 federal court ruling that created substantial uncertainty around these laws. To be more specific about the treatment variable, for a firm incorporated in Texas, the "on" period consists of 1997 to 2003, whereas the "off"

[10]In regressions not reported here, I cluster standard errors at the state of headquarters, state of incorporation, and firm level and find similar results.

period consists of 1992 to 1996 and 2004 to 2009.

I control for time-invariant characteristics at the plant level through plant fixed effects. Following Bertrand and Mullainathan (2003), I use state of incorporation fixed effects to control for time-invariant differences between treated and untreated plants. In addition, I use state of headquarters fixed effects, given that my definition of treatment includes both state of incorporation and state of headquarters. The state of location dummies interacted with industry and year dummies, α_{lst}, allow me to fully control for contemporaneous shocks at the state of location and industry levels. There are two main reasons why I use state and industry dummies. First, as documented in Foster et al. (2014), total factor productivity shows considerable variation across industries. For this reason, industry differences need to be controlled. Second, the TFP measure I am using is essentially a revenue measure. Demand shocks at different geographies may inflate or deflate my TFP measure in a way totally unrelated to the productive efficiency, which constitutes the main reason why I control for state of location. For these two main reasons, I use state-industry-year fixed effects to fully control for contemporaneous shocks at the state of location. I use fixed effects instead of demeaning the dependent variable at the state-industry-year level because demeaning can lead to inconsistent estimates (Gormley and Matsa, 2013). The coefficient of interest is δ, which measures the effect of anti-recharacterization laws on TFP.

One potential problem is related to the endogeneity of anti-recharacterization laws. If firms in my sample lobbied for these laws, then enactment of these laws might be correlated with unobserved factors affecting firms' productivity. First, Kettering (2008) describes the enactment of anti-recharacterization laws as a great success of the securitization industry. Kettering (2008) argues that these statutes are the product of efforts by the financial industry to totally abolish the possibility of recharacterization. Second, I address this concern with a dynamic analysis explained in great detail in Section 3.2. If these laws are the result of economic factors leading firms to lobby for them, then I should be able to detect their effect before their enactment. My dynamic analysis shows no such effect.

2.4. Empirical Results

This section documents how anti-recharacterization laws affect firms' productivity as well as their investment decisions. In Section 4.1, I analyze how stronger creditor rights affect total as well as factor productivities. In Section 4.2, I investigate the channel through which stronger creditor rights translate into increasing productivity.

2.4.1. Anti-Recharacterization Laws and Productivity

I first estimate equation (2) with the natural logarithm of total factor productivity as the dependent variable. Table 2.2 presents the results.

Column [1] presents results from estimation of equation (2) with only plant and year fixed effects. The estimated coefficient of interest, which is the one on ARL, is 0.032, and it is significant at the 1 percent confidence level. The positive sign of this estimate is in line with the prediction that stronger creditor rights will lead firms to operate more efficiently. To put this estimate in economic terms, I follow Schoar (2002) and Krishnan et al. (2014). Holding inputs constant, a 3.2 percent increase in total factor productivity corresponds to a 3.2 percent increase in revenues. Since the elasticity of profits to total factor productivity is greater than one, increase in revenues will result in a greater increase in profits, the magnitude of which will depend on the profit margin. Assuming a profit margin of 20 or 40 percent, a 3.2 percent increase in total factor productivity will lead to a 16 or 8 percent increase in profits, respectively, which is economically significant.

Column [2] adds state of incorporation and state of headquarters fixed effects to control for time-invariant differences between treated and untreated firms. The inclusion of these fixed effects decreases the estimated coefficient to 0.027. However, this coefficient is still significant at the 1 percent confidence level, and translates into a 2.7 percentage-point increase in total factor productivity.

Column [3] adds state of location-industry-year fixed effects to the estimation in column [2] to further tighten the specification. As discussed in Section 3.1.3, these interacted dummies allow me to control for contemporaneous shocks at the state of location level. The inclusion of these controls makes a small change to the estimated coefficient of interest, which is 0.026 and significant at the 1 percent confidence level. The enactment of anti-recharacterization laws is associated with an economically and statistically significant increase in total factor productivity.

In Table 2.3, I look at the effects of anti-recharacterization laws on factor productivities. Columns [1] to [3], and [4] to [6], report results for labor and capital productivity, respectively. For labor productivity, estimated coefficients of interest range between 0.057 and 0.068 across specifications. Estimates are both economically and statistically significant, which suggests that increase in labor productivity is an important driver of an increase in total factor productivity.

In columns [4] to [6], I follow Giroud and Mueller (2015), and use return on capital (ROC), which is calculated as total value of shipments minus labor, material, and energy costs scaled by capital stock to proxy for capital productivity. Estimated coefficients are both economically and statistically significant.

Taken together, these estimates indicate that the passage of anti-recharacterization laws leads to an economically large and statistically robust effect on total factor productivity and capital and labor productivities of treated plants. These estimates suggest a positive impact of stronger creditor rights, leading firms to operate more efficiently.

2.4.1.1. Robustness Checks

I next conduct several tests to ensure the robustness of the results in Table 2.2. One potential problem is that spurious correlation might be driving the results in Table 2.2. Some unobserved covariates or changing economic conditions might be inducing firms to operate more efficiently as well as lobby for the anti-recharacterization laws. While there seems to be no perfect way to address this concern, I estimate a dynamic version of equation (2) to investigate when the effects of these laws materialize. If there is a spurious correlation due to changing economic conditions, it is reasonable to expect a significant effect on productivity before the passage of these laws.

Table 2.4 investigates the dynamic effects of anti-recharacterization laws. In column [1], the estimated coefficient on $Before^{-1}$ is economically small and statistically insignificant. The estimated coefficient on $Before^{0}$, which represents the year anti-recharacterization laws passed, is economically bigger. However, it lacks statistical significance. Finally, the coefficients on $After^{1}$ and $After^{2+}$ are both economically and statistically significant. In line with my expectations, this shows that the effects of these laws on total factor productivity start materializing one year after their passage.

Columns [2] and [3] conduct the same analysis in column [1] for labor productivity and return on capital, respectively. In column [2], there is no significant effect on labor productivity before the passage of the laws: the estimated coefficient on $Before^{-1}$ is economically small and statistically insignificant. The coefficient on $Before^{0}$ is 0.060 and significant at the 1 percent confidence level. For the following years, the coefficients get bigger: 0.100 and 0.090 for $After^{1}$ and $After^{2+}$, respectively, and they are significant at the 1 percent confidence level.

Column [3] further strengthens the causal interpretation of these laws: The coefficient on $Before^{-1}$ is statistically indistinguishable from zero. Taken together, none of the columns in Table 2.4 show a significant effect of these laws before they are passed, which allays the concerns that these laws were passed as a result of changing economic conditions.

In Table 2.5, I conduct another test to check the validity of the results in Table 2.2 and 2.3. One might worry that there are regional shocks affecting firms headquartered or incorporated in treated and nearby states. Hence, my estimates might simply be picking up these regional shocks rather than the effect of anti-recharacterization laws. I address this

issue in the following way: following Campello and Larrain (2016), I falsely assume that states bordering Texas, Louisiana, and Alabama passed the anti-recharacterization laws. Columns [1] to [3] report results using total factor productivity, labor productivity, and return on capital, respectively, as dependent variables using falsely assumed treated states. None of the three estimations give a significant result, which shows that results in Table 2.2 and Table 2.3 are not artifacts of some regional or political shocks affecting states in the near geography of Texas, Louisiana, and Alabama.

There are several concerns related to the productivity measure I am using in my baseline estimations. One criticism of this measure is that it does not take into account selection and simultaneity issues. The selection problem arises because of the exit of unproductive plants, whereas the simultaneity problem arises when firms increase (decrease) output and input at the same time in response to a positive (negative) productivity shock, which introduces correlation between the error term and the inputs in the estimation of TFP. To address selection and simultaneity issues, I employ the structural techniques of Olley and Pakes (1996) and Levinsohn and Petrin (2003). Estimated coefficients of interest are very similar to the ones in Table 2.2.

In ASM, plants with more than 250 employees are always included, whereas plants with a smaller number of employees are chosen randomly, with a probability positively correlated with their number of employees. This sampling policy creates bias toward larger plants. To address this, I reestimate the baseline regression by weighting observations by their respective ASM sample weight. Results are very similar to those in Table 2.2.

2.4.2. Channel behind Creditor Rights and Increasing Productivity

2.4.2.1. Debt

From this point on, I investigate the channel through which stronger creditor rights translate into increasing productivity. In this section, I analyze whether stronger creditor rights as a result of anti-recharacterization laws lead firms to increase their borrowing. On the theoretical front, the effect of stronger creditor rights on the borrowing behavior of firms is not obvious. On the one hand, relaxation of collateral constraints would induce firms to borrow more, as predicted in Hart and Moore (1994). On the other hand, as seen in Vig (2013), increasing access to collateral by creditors might lead firms to decrease their use of secured debt.

Table 2.6 shows that consistent with Hart and Moore (1994) and Li et al. (2016), treated firms increase their borrowing. In columns [1] and [2], long-term debt scaled by total assets increases significantly. The estimated coefficient of interest is statistically significant at the

1 percent confidence level. In columns [3] and [4], leverage, defined as the sum of long-term and short-term debt divided by total assets, increases significantly. Finally, in columns [5] and [6], the dependent variable is defined to be the natural logarithm of the sum of long-term and short-term debt to ensure that the results in columns [1] to [4] are not driven by the asset values in the denominator. Estimated coefficients show that total debt increases by approximately 14 percent, which is economically significant. These results confirm that anti-recharacterization laws relax the borrowing constraints of treated firms by allowing creditors more access to collateral.

2.4.2.2. Financial Constraints and Productivity

If firms can't make productivity-enhancing investments because of financial constraints, then a relaxation of borrowing constraints as a result of improved access to collateral by creditors should have a stronger effect on the productive efficiency of constrained firms, which constitutes the hypothesis I am testing in this section.

I focus on three different measures of financial constraints. Following Giroud and Mueller (2015), for all three financing constraint measures I use, I take the median value one year before the treatment across all companies to classify firms as financially constrained or financially unconstrained. My first measure of financing constraints is firm size. I classify firms as financially constrained (unconstrained) if their lagged asset value is below (above) the median. Second, I use the size-age (SA) index first used in Hadlock and Pierce (2010). I classify firms as financially constrained (unconstrained) if their SA value, which is a linear combination of their asset value and age, is above (below) the median. Finally, I use the Whited-Wu index first used in Whited and Wu (2006). I classify firms as financially constrained (unconstrained) if their Whited-Wu value is above (below) the median.

Table 2.7 presents the results. Columns [1], [3], and [5] show that plants belonging to financially constrained firms experience a significant increase in total factor productivity following the passage of anti-recharacterization laws. Estimated coefficients are statistically significant at the 1 percent confidence level. Columns [2], [4], and [6] indicate that there is no significant change in the total factor productivity of plants belonging to financially unconstrained firms. All estimated coefficients are statistically indistinguishable from zero.[11] Results in this table show that following a relaxation of borrowing constraints, financially constrained firms use the extra financing to operate more efficiently.

If a firm is financially constrained, then optimality implies that increased access to finance as a result of relaxation of borrowing constraints will be spread across other units to equate

[11] F-tests ensure that difference between estimated coefficients for constrained and unconstrained firms is statistically significant at the 1 percent confidence level.

the marginal revenue product across units. In Table 2.8, I test this implication by looking at the productivity of plants differing in location with respect to the state of headquarters and state of incorporation. I classify each plant as near or far depending on its state of location. I classify a plant as near if it is located at either the state of headquarters or the state of incorporation of the firm it belongs to, far otherwise. This test also allows me to see whether baseline results in Table 2.2 are an artifact of some local economic shocks in Texas, Louisiana, or Alabama.

Table 2.8 shows that plants both in and out of these treated states experience an increase in productivity, which is in line with the implication that financially constrained firms spread financing shocks to all of their units.

2.4.2.3. Investment Composition

Results so far show that firms borrow more and operate more efficiently following the enactment of anti-recharacterization laws. In this section, I will try to establish the link between increased borrowing and increased productively by looking at investments made at the plant level.

There is an important literature arguing that relaxation of collateral-based lending constraints will result in higher investment by firms.[12] However, not all investment is the same in terms of productivity consequences. Firms might be investing in pet projects, or invest in land or buildings that may have little effect on the efficiency of the production process. Therefore, the composition of investment plays a critical role for productivity.

One aspect of investment composition relevant for productivity is vintage of capital. Eisfeldt and Rampini (2007) show that investing in used capital rather than new capital is very common among credit-constrained firms. They also show that the fraction of used capital expenditures relative to total capital expenditures decreases significantly as one moves toward relatively less constrained firms. If new capital is more productive due to technological progress, then firms can become productive by investing in new capital rather than used capital. This line of reasoning is in line with Midrigan and Xu (2014), who argue that distortion of technology adoption decisions is an important channel through which financial frictions decrease productivity. According to this argument, following the relaxation in borrowing constraints, firms become more productive by increasing their technology adoption.

A second aspect of investment composition relates to the capital-labor ratio. Garmaise (2008) argues that constrained firms are much more labor-intensive in their production process. He also predicts that productivity of constrained firms will decrease over time since

[12]Chaney et al. (2012), Gan (2007), and Peek and Rosengren (2000) are prominent examples of this literature.

they cannot shift to a more capital-intensive production process.

One of the main reasons why there is relatively limited research about the composition of investment is data limitations. Aggregate items like capital investment expenditures or plant, property, and equipment reported by standard corporate data sources cannot inform us about the vintage of the productive assets or the number of machines per labor in a manufacturing plant. Furthermore, the difficulty of finding reliable firm- or plant-level employment numbers constitutes another obstacle against any attempt to analyze the capital intensity of a firm's production.

The Census provides two important variables for my vintage and technology adoption analysis: new machinery expenditures and capital expenditures for computers. Columns [1] to [3] of Table 2.9 document how the new machinery investments[13] of treated firms change following the adoption of anti-recharacterization laws. The dependent variable is new machinery investment, calculated by scaling new machinery expenditures by the lagged capital stock. The CMF and ASM databases provide detailed description of machinery-related expenditures by differentiating between new and old machinery expenditures. Results indicate that treated plants increase their new machinery investments. The estimated coefficient of interest in column [3] is 0.008, and it is significant at the 1 percent confidence level. In terms of economic magnitudes, this estimate corresponds to a 7.5 percent increase relative to the sample mean, which is significant.

Capital expenditures for computers constitute the second variable for the analysis in Table 2.9. There is an important literature on the relationship between information technology (IT), computers, and output.[14] Two recent studies in the finance literature examine the impact of IT-related investments. First, Brav et al. (2015) show that IT-related investments by hedge funds contribute to the productivity of target firms. Second, Agrawal and Tambe (2016) argue that many employees in target firms benefit from IT-related private

[13]Census defines machinery expenditures in the following way: "Machinery expenditures include outlays for the following types of equipment: lathes, punch presses and similar machinery and equipment for use in production, as well as office machines and fixtures, computers, furniture, cafeteria and dressing room furnishings, automobiles and tracks, and other similar equipment. Capital expenditures also include the value of major improvements and repairs to existing machinery and equipment, if the cost is capitalized, whether repairs and improvements were purchased or made by employees of the reporting establishment." Census defines new machinery expenditures in the following way: "New Machinery Expenditures consist of capital expenditures during the year for new production machinery and equipment and other new machinery and equipment, including replacements as well as additions to capacity. New equipment manufactured by the plant for use in its own production should be included in this category."

[14]By using survey data from 584 establishments and 21 industries, Kelley (1994) shows that computer-controlled machinery is key to efficiency in manufacturing process. Greenman and Mairesse (1996) examine the French manufacturing and service industries and argue that use of computers impacts productivity positively. Finally, Black and Lynch (2001), using a nationally representative sample of businesses, show that plant productivity is positively correlated with greater computer usage by non-managerial employees.

equity investments by acquiring new skills. They show that workers treated with a private equity investment earn higher wages on average. Therefore, IT-related investment can be a channel through which stronger creditor rights translate into increasing productive efficiency. Columns [4] to [6] of Table 2.9 document how computer investment changes following the passage of anti-recharacterization laws. The dependent variable is computer investment, defined as capital expenditures for computers scaled by lagged capital stock. I observe that treated plants increase their computer investment. The estimated coefficients are statistically significant at the 1 percent or 5 percent confidence level.

A potential problem with the results in columns [1] to [6] is that the increase in new machinery and computer investments does not necessarily mean that the average productive capital is becoming newer. Used capital expenditures might be increasing as well. To check this, in columns [7] to [9], in line with Eisfeldt and Rampini (2007), I analyze how the fraction of new machinery expenditures relative to total capital expenditures changes. I find that the fraction of new machinery expenditures relative to total capital expenditures increases significantly at treated plants. Estimated coefficients of interest are statistically significant at the 1 percent confidence level in all columns. The estimated coefficient in column [3] is 0.027, and is economically significant given that it constitutes about 12.2 percent of its standard deviation (0.221) among the full sample of plants. Therefore, I make sure that the treated plants are moving toward a younger vintage and newer technology.

The second compositional aspect I analyze relates to the capital-intensity of the production. The CMF and ASM data sets provide two advantages regarding the labor component of my analysis. First, both data sets are of the highest quality and reliability given that misreporting is penalized. Second, these two data sets provide a variety of labor-related variables, including number of employees, total hours worked, total payroll, and production payroll, which will allow me to make sure that any result I get about the capital-labor ratio is not an artifact of the labor measure I am using.

The results in Table 2.9 do not necessarily indicate that production is becoming more capital-intensive. In a plant where the number of employees grows faster than machinery, we might wrongfully interpret increases in machinery investment as making the plant more machinery-intensive. Therefore, in Table 2.10, I analyze new machinery investment in conjunction with labor. The dependent variable is new machinery expenditures scaled by labor. In each column, I use a different variable to represent labor: total payroll, production payroll, employees, and total hours. In column [1], *total payroll* represents the total amount of wages and salaries. In column [2], *production payroll* represents the total amount of wages and salaries paid to production workers. In column [3], *employees* represents the number of employees. Finally, in column [4], *total hours* represents the total number of hours worked.

The results in all columns indicate that new machinery expenditures per labor increase significantly at treated plants following the adoption of anti-recharacterization laws. Therefore, in line with Garmaise (2008), I show that increasing capital intensity is associated with relaxation of borrowing constraints and increasing productivity.

In Table 2.11, I investigate where the increase in productivity reported in Table 2.2 is coming from. If financial constraints cause firms not to take up productive projects, relaxation of these constraints should make the greatest impact on parts of the firm that remain unproductive because of these constraints. This makes more sense in an environment where firms operate in multiple industries and have limited budgets, which makes them unable to make productivity-enhancing investments in all segments in which they operate. Therefore, I expect that unproductive plants should experience the greatest change in productivity as well as change in productivity-enhancing investments reported in Table 2.9 and 2.10. Table 2.11 uses total factor productivity one year before the treatment to rank plants. I adopt a within-firm productivity ranking of plants. Columns [1] and [2] use the same dependent variable I used in column [1] of Table 2.11, new machinery expenditures over total payroll, whereas columns [3] and [4] use total factor productivity as the dependent variable. After ranking the plants based on their productivity, I look at how their new machinery expenditures over total payroll and TFP change during the following three years. First, I see that initially unproductive plants experience both an economically and statistically significant increase in productivity. In column [4], the estimated coefficient on $ARL \times Unproductive$ is 0.052, which translates into a productivity increase of 5.2 percentage points, and is statistically significant at the 1 percent confidence level. Productive plants before the treatment do not appear to become more productive, given that the estimated coefficient on $ARL \times Productive$ is statistically indistinguishable from zero. Second, columns [1] and [2] show that initially unproductive plants that happen to experience a substantial increase in productivity are the ones that happen to benefit from an increase in new machinery expenditures per unit of labor. The estimated coefficient on $ARL \times Unproductive$ is statistically different from zero at the 1 percent confidence level. Therefore, a within-firm productivity ranking of plants helps me nail down the one-to-one relationship between the increasing productivity and capital intensity reported in the first and second parts of my empirical analysis, respectively.

Taken together, the results in Table 2.6 to Table 2.11 show that following the enactment anti-recharacterization laws, treated manufacturing firms borrow more and make two compositional changes in their investments: first, they increase the share of total capital expenditures on new capital by increasing new machinery and computer investments. Second, they increase the capital- and machine-intensity of their plants. These changes happen to primarily benefit the productivity of initially unproductive plants. This also suggests

that the underlying reason why these plants were unproductive in the first place is that productivity-enhancing investments were not being done because of financial constraints.

2.5. Conclusion

Using plant-level data from the Census, I first show that the total factor productivity of plants belonging to treated firms increases significantly, by 2.6 percent, following the adoption of anti-recharacterization laws in Texas, Louisiana, and Alabama. The granularity of my data helps me compare two plants in the same state, industry, and year. My baseline results survive various robustness checks, including a dynamic analysis of the effects of laws and a placebo test where treated states are falsely assumed to be neighboring states.

As argued in Li et al. (2016), anti-recharacterization laws allow secured creditors to seize collateral easily in case the debtor declares bankruptcy. I show that this improved ability to access collateral mainly benefits the productive efficiency of financially constrained firms: productivity of plants belonging to financially constrained firms increases, whereas there is no significant change for plants belonging to financially unconstrained firms. This finding is in line with previous research arguing that a relaxation of financial constraints induces firms to increase their productivity by adopting productivity-enhancing projects (Midrigan and Xu, 2014; Krishnan et al., 2014).

In the second part of my empirical analysis, I analyze two compositional aspects of investment argued to be related to financial constraints and having the potential to affect productivity. First, I show that treated plants invest in capital of younger vintage and newer technology by increasing their new machinery and computer investments. Second, I document that new machinery expenditures per labor increase, which means that treated plants move toward a more mechanized and capital-intensive production. Finally, I document that these investments primarily benefit initially unproductive plants, which experience the highest increase in productivity following the enactment of laws. This finding suggests that firms now can take up productive projects for their plants they could not previously invest in due to borrowing constraints.

My results are consistent with the view that stronger creditor rights during bankruptcy can help firms have more access to credit and to productivity-enhancing projects. My findings have crucial policy implications, especially in a time period where advanced economies suffer from dismal productivity growth.

2.6. Tables

Table 2.1 Creditor Rights and Productivity: Summary Statistics

This table provides sample summary statistics. Plant-level data are taken from the CMF/ASM-Compustat match for the years 1992–2009. The unit of observation is a plant-year. All variables are defined in Appendix A.1

	Full Sample			Recharacterization			Anti-Recharacterization		
	Rounded N	Mean	SD	Rounded N	Mean	SD	Rounded N	Mean	SD
Total Payroll	220,000	15,170	46,812	210,000	15,284	47,254	10,000	11,885	31,233
Production Payroll	220,000	8,457	22,707	210,000	8,484	22,748	10,000	7,662	21,462
Employees	220,000	339	787	210,000	342	795.609	10,000	250	482
Total Hours	220,000	838	2,177	210,000	846	2196	10,000	617	1499
Average Wage	220,000	39.328	17.631	210,000	39.337	17.689	10,000	39.079	15.860
Labor Productivity	220,000	3.955	0.893	210,000	3.952	0.891	10,000	4.051	0.931
Total Factor Productivity	220,000	1.802	0.593	210,000	1.802	0.594	10,000	1.822	0.577
Output	220,000	150,495	1,633,717	210,000	148,267	1,629,079	10,000	215,044	1,761,671
Plant Size	220,000	10.531	1.472	210,000	10.542	1.463	10,000	10.220	1.687
Plant Age	220,000	19.083	8.825	210,000	19.130	8.821	10,000	17.709	8.821
Return on Capital	220,000	1.481	2.083	210,000	1.482	2.081	10,000	1.434	2.136
Capital Stock	220,000	55,711	255,295	210,000	55,265	256,634	10,000	68,622	212,485
Employment Growth	170,000	–0.026	0.224	165,000	–0.026	0.090	5,000	–0.027	0.254
Investment	170,000	0.090	0.130	165,000	0.223	0.129	5,000	0.093	0.147
New Machinery Investment	140,000	0.107	0.112	133,000	0.107	0.112	7,000	0.107	0.118
New Machinery Over Total Payroll	140,000	0.229	0.371	133,000	0.226	0.365	7,000	0.300	0.480
New Machinery Over Production Payroll	140,000	0.431	0.767	133,000	0.427	0.758	7,000	0.545	0.947
New Machinery Over Employees	140,000	8.446	14.886	133,000	8.282	14.557	7,000	12.449	21.006
New Machinery Over Total Hours	140,000	3.595	6.489	133,000	3.518	6.333	7,000	5.461	9.350
Computer Investment	110,000	0.004	0.010	106,000	0.004	0.010	4,000	0.003	0.009

Table 2.2 Creditor Rights and Productivity: Baseline Estimates

This table presents estimates of the plant-level impact of anti-recharacterization laws on total factor productivity (TFP). The main independent variable is *ARL*, which is an indicator variable that equals one if a firm is headquartered in a treated state between 1997 and 2001 or incorporated in a treated state between 1997 and 2003. The unit of observation in each regression is a plant-year pair. Control variables include size and age of the plant as well as the number of plants owned by the firm. All variables are defined in Appendix A. Standard errors (in parentheses) are clustered at the state of location level. ***, **, and * denote statistical significance at the 1, 5, and 10 percent levels, respectively.

Dependent Variable: *TFP*			
	[1]	[2]	[3]
ARL	0.032***	0.027***	0.026***
	(0.008)	(0.010)	(0.010)
Control Variables	Y	Y	Y
Plant Fixed Effects	Y	Y	Y
Year Fixed Effects	Y	Y	Y
State of Incorporation Fixed Effects	N	Y	Y
State of Headquarters Fixed Effects	N	Y	Y
State of Location-Industry-Year Fixed Effects	N	N	Y
Rounded N	220,000	220,000	220,000
R^2	0.77	0.77	0.74

Table 2.3 Creditor Rights and Productivity: Labor and Capital Productivities

This table presents estimates of the plant-level impact of anti-recharacterization laws on labor and capital productivities. The dependent variables in columns [1] to [3] and [4] to [6] are labor and capital productivities, respectively. Labor productivity is defined as the natural logarithm of value added per labor hour. Return on capital, calculated as sales minus material and energy costs and payroll divided by plant-level capital stock, is used to measure capital productivity. The unit of observation in each regression is a plant-year pair. The main independent variable is *ARL*, which is an indicator variable that equals one if a firm is headquartered in a treated state between 1997 and 2001 or incorporated in a treated state between 1997 and 2003. Control variables include size and age of the plant as well as the number of plants owned by the firm. All variables are defined in Appendix A. Standard errors (in parentheses) are clustered at the state of location level. ***, **, and * denote statistical significance at the 1, 5, and 10 percent levels, respectively.

Dependent Variable:	*Labor Productivity*			*Return on Capital*		
	[1]	[2]	[3]	[4]	[5]	[6]
ARL	0.058***	0.057**	0.068***	0.090***	0.082**	0.095***
	(0.023)	(0.026)	(0.032)	(0.037)	(0.037)	(0.036)
Control Variables	Y	Y	Y	Y	Y	Y
Plant Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y
State of Incorporation Fixed Effects	N	Y	Y	N	Y	Y
State of Headquarters Fixed Effects	N	Y	Y	N	Y	Y
State of Location-Industry-Year Fixed Effects	N	N	Y	N	N	Y
Rounded N	220,000	220,000	220,000	220,000	220,000	220,000
R^2	0.77	0.77	0.77	0.74	0.74	0.74

Table 2.4 Creditor Rights and Productivity: Dynamic Estimates

This table presents estimates of the plant-level impact of anti-recharacterization laws on total factor, labor, and capital productivities. Columns [1] to [3] use total factor productivity (TFP) and labor and capital productivities, respectively, as dependent variables. Labor productivity is defined as the natural logarithm of value added per labor hour. Return on capital, calculated as sales minus material and energy costs and payroll divided by plant-level capital stock, is used to measure capital productivity. The unit of observation in each regression is a plant-year pair. $Before^{-1}$ is an indicator variable that equals one if the plant belongs to a firm headquartered or incorporated in a state that will pass anti-recharacterization laws in one year. $Before^{0}$ is an indicator variable that equals one if the plant belongs to a firm headquartered or incorporated in a state that passes anti-recharacterization laws that year. $After^{1}$ is an indicator variable that equals one if the plant belongs to a firm headquartered or incorporated in a state that passed anti-recharacterization laws one year ago. $After^{2+}$ is an indicator variable that equals one if the plant belongs to a firm headquartered or incorporated in a state that passed anti-recharacterization laws two years ago or more. Control variables include size and age of the plant as well as the number of plants owned by the firm. All variables are defined in Appendix A. Standard errors (in parentheses) are clustered at the state of location level. ***, **, and * denote statistical significance at the 1, 5, and 10 percent levels, respectively.

Dependent Variable:	*TFP*	*Labor Productivity*	*Return on Capital*
	[1]	[2]	[3]
$Before^{-1}$	-0.009	0.017	0.036
	(0.012)	(0.025)	(0.028)
$Before^{0}$	0.014	0.060***	0.160***
	(0.012)	(0.016)	(0.043)
$After^{1}$	0.039**	0.100***	0.318**
	(0.019)	(0.020)	(0.132)
$After^{2+}$	0.060***	0.090***	0.160**
	(0.015)	(0.018)	(0.079)
Control Variables	Y	Y	Y
Plant Fixed Effects	Y	Y	Y
Year Fixed Effects	Y	Y	Y
State of Incorporation Fixed Effects	Y	Y	Y
State of Headquarters Fixed Effects	Y	Y	Y
State of Location-Industry-Year Fixed Effects	Y	Y	Y
Rounded N	220,000	220,000	220,000
R^2	0.77	0.77	0.74

Table 2.5 Creditor Rights and Productivity: Placebo Treatment

This table presents estimates of the plant-level impact of placebo anti-recharacterization laws on total factor, labor, and capital productivities. In this robustness exercise, I falsely assume that states bordering Texas, Louisiana, or Alabama are treated. Columns [1] to [3] use total factor productivity (TFP) and labor and capital productivities, respectively, as dependent variables. Labor productivity is defined as the natural logarithm of value added per labor hour. Return on capital, calculated as sales minus material and energy costs and payroll divided by plant-level capital stock, is used to measure capital productivity. The unit of observation in each regression is a plant-year pair. The main independent variable is *ARL*, which is an indicator variable that equals one if a firm is headquartered in a treated state between 1997 and 2001 or incorporated in a treated state between 1997 and 2003. Control variables include size and age of the plant as well as the number of plants owned by the firm. All variables are defined in Appendix A. Standard errors (in parentheses) are clustered at the state of location level. ***, **, and * denote statistical significance at the 1, 5, and 10 percent levels, respectively.

Dependent Variable:	*TFP*	*Labor Productivity*	*Return on Capital*
	[1]	[2]	[3]
ARL	0.009	-0.004	-0.039
	(0.013)	(0.020)	(0.051)
Control Variables	Y	Y	Y
Plant Fixed Effects	Y	Y	Y
Year Fixed Effects	Y	Y	Y
State of Incorporation Fixed Effects	Y	Y	Y
State of Headquarters Fixed Effects	Y	Y	Y
State of Location-Industry-Year Fixed Effects	Y	Y	Y
Rounded N	220,000	220,000	220,000
R^2	0.77	0.77	0.74

Table 2.6 Creditor Rights and Productivity: Debt

This table presents estimates of the firm-level impact of anti-recharacterization laws on long-term debt, leverage, and total debt. I define the long-term debt, leverage, and total debt as long-term debt scaled by total assets, sum of long-term and short-term debt scaled by total assets, and the natural logarithm of sum of long-term and short-term debt, respectively. The main independent variable is *ARL*, which is an indicator variable that equals one if a firm is headquartered in a treated state between 1997 and 2001 or incorporated in a treated state between 1997 and 2003. The unit of observation in each regression is a firm-year pair. Firm controls include the natural logarithm of sales, profitability, Tobin's Q, and tangibility. All variables are defined in Appendix A. Standard errors (in parentheses) are clustered at the state of location level. ***, **, and * denote statistical significance at the 1, 5, and 10 percent levels, respectively.

Dependent Variable:	*Long-Term Debt*		*Leverage*		*Total Debt*	
	[1]	[2]	[3]	[4]	[5]	[6]
ARL	0.019***	0.018***	0.017***	0.013**	0.136**	0.137**
	(0.006)	(0.006)	(0.006)	(0.060)	(0.058)	(0.007)
Sales		0.024***		0.024***		0.024***
		(0.002)		(0.002)		(0.002)
Profitability		-0.127***		-0.127***		-0.127***
		(0.017)		(0.017)		(0.017)
Tobin's Q		-0.009***		-0.009***		-0.009***
		(0.001)		(0.001)		(0.001)
Tangibility		0.106***		0.106***		0.106***
		(0.014)		(0.014)		(0.014)
Firm FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Rounded N	30,000	30,000	30,000	30,000	30,000	30,000
R^2	0.71	0.68	0.71	0.68	0.71	0.68

Table 2.7 Creditor Rights and Productivity: Financial Constraints

This table presents estimates of the plant-level impact of anti-recharacterization laws on total factor productivity (TFP) across ex ante financially constrained and unconstrained firms. The unit of observation in each regression is a plant-year pair. The main independent variable is *ARL*, which is an indicator variable that equals one if a firm is headquartered in a treated state between 1997 and 2001 or incorporated in a treated state between 1997 and 2003. Columns [1] and [2] classify firms below the median of the size distribution (lagged total assets) as constrained and firms above the median as unconstrained. Columns [3] and [4], and [5] and [6], use the median of Hadlock and Pierce (2010), and Whited and Wu (2006) measures, respectively, to classify firms as constrained and unconstrained. Plant controls include age and total value of shipments. Control variables include size and age of the plant as well as the number of plants owned by the firm. All variables are defined in Appendix A. Standard errors (in parentheses) are clustered at the state of location level. ***, **, and * denote statistical significance at the 1, 5, and 10 percent levels, respectively.

Dependent Variable: *TFP*	Firm Size		Hadlock-Pierce		Whited-Wu	
	Constrained	Unconstrained	Constrained	Unconstrained	Constrained	Unconstrained
	[1]	[2]	[3]	[4]	[5]	[6]
ARL	0.074***	0.002	0.092***	-0.007	0.068***	-0.011
	(0.023)	(0.011)	(0.023)	(0.010)	(0.023)	(0.011)
Control Variables	Y	Y	Y	Y	Y	Y
Plant Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y
State of Incorporation Fixed Effects	Y	Y	Y	Y	Y	Y
State of Headquarters Fixed Effects	Y	Y	Y	Y	Y	Y
State of Location-Industry-Year Fixed Effects	Y	Y	Y	Y	Y	Y
Rounded N	30,000	170,000	30,000	170,000	30,000	170,000
R^2	0.78	0.75	0.79	0.75	0.77	0.74

Table 2.8 Creditor Rights and Productivity: Productivity Change Across Plants Differing in Location

This table presents estimates of the plant-level impact of anti-recharacterization laws on productivity across plants differing in location with respect to the state of headquarters and state of incorporation. Each plant is classified as near or far depending on its state of location. A plant is classified as near if it is located at either the state of headquarters or the state of incorporation of the firm it belongs to, far otherwise. *ARL* is an indicator variable that equals one if a firm is headquartered in a treated state between 1997 and 2001 or incorporated in a treated state between 1997 and 2003. The unit of observation in each regression is a plant-year pair. Control variables include size and age of the plant as well as the number of plants owned by the firm. All variables are defined in Appendix A. Standard errors (in parentheses) are clustered at the state of location level. ***, **, and * denote statistical significance at the 1, 5, and 10 percent levels, respectively.

Dependent Variable: *TFP*			
	[1]	[2]	[3]
$ARL \times Near$	0.036**	0.036**	0.039**
	(0.015)	(0.014)	(0.016)
$ARL \times Far$	0.029***	0.023**	0.020**
	(0.009)	(0.011)	(0.010)
Control Variables	Y	Y	Y
Plant Fixed Effects	Y	Y	Y
Year Fixed Effects	Y	Y	Y
State of Incorporation Fixed Effects	N	Y	Y
State of Headquarters Fixed Effects	N	Y	Y
State of Location-Industry-Year Fixed Effects	N	N	Y
Rounded N	220,000	220,000	220,000
R^2	0.76	0.76	0.79

Table 2.9 Creditor Rights and Productivity: New Machinery and Computer Investments

This table presents estimates of the plant-level impact of anti-recharacterization laws on new machinery and computer investment. The dependent variables in columns [1] to [3] and [4] to [6] are new machinery and computer investments, respectively. New machinery investment is defined as new machinery expenditures scaled by capital stock. Computer investment is defined as capital expenditures for computers divided by capital stock. The main independent variable is *ARL*, which is an indicator variable that equals one if a firm is headquartered in a treated state between 1997 and 2001 or incorporated in a treated state between 1997 and 2003. The unit of observation in each regression is a plant-year pair. Control variables include size and age of the plant as well as the number of plants owned by the firm. All variables are defined in Appendix A. Standard errors (in parentheses) are clustered at the state of location level. ***, **, and * denote statistical significance at the 1, 5, and 10 percent levels, respectively.

Dependent Variable:	*New Machinery Investments*			*Computer Investments*			*Share of New Machinery*		
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
ARL	0.006**	0.010***	0.008***	0.0005***	0.0006**	0.0009***	0.023***	0.025***	0.027***
	(0.003)	(0.003)	(0.003)	(0.0002)	(0.0003)	(0.0003)	(0.006)	(0.007)	(0.007)
Control Variables	Y	Y	Y	Y	Y	Y	Y	Y	Y
Plant Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
State of Incorporation Fixed Effects	N	Y	Y	N	Y	Y	N	Y	Y
State of Headquarters Fixed Effects	N	Y	Y	N	Y	Y	N	Y	Y
State of Location-Industry-Year Fixed Effects	N	N	Y	N	N	Y	N	N	Y
Rounded N	140,000	140,000	140,000	110,000	110,000	110,000	140,000	140,000	140,000
R^2	0.37	0.37	0.42	0.43	0.43	0.49	0.43	0.43	0.49

Table 2.10 Creditor Rights and Productivity: New Machinery Expenditures Over Labor

This table presents estimates of the plant-level impact of anti-recharacterization laws on new machinery expenditures over labor. Columns [1], [2], [3], and [4] use new machinery expenditures over total payroll, production workers' payroll, number of employees, and total hours worked, respectively, as the dependent variable. The unit of observation in each regression is a plant-year pair. The main independent variable is *ARL*, which is an indicator variable that equals one if a firm is headquartered in a treated state between 1997 and 2001 or incorporated in a treated state between 1997 and 2003. Control variables include size and age of the plant as well as the number of plants owned by the firm. All variables are defined in Appendix A. Standard errors (in parentheses) are clustered at the state of location level. ***, **, and * denote statistical significance at the 1, 5, and 10 percent levels, respectively.

Dependent Variable:	*New Machinery over Total Payroll* [1]	*New Machinery over Production Payroll* [2]	*New Machinery over Employees* [3]	*New Machinery over Total Hours* [4]
ARL	0.024**	0.046***	1.210***	0.610***
	(0.010)	(0.017)	(0.365)	(0.167)
Control Variables	Y	Y	Y	Y
Plant FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
State of Incorporation FE	Y	Y	Y	Y
State of Headquarters FE	Y	Y	Y	Y
State of Location-Industry-Year FE	Y	Y	Y	Y
Rounded N	140,000	140,000	140,000	140,000
R^2	0.50	0.54	0.55	0.55

Table 2.11 Creditor Rights and Productivity: Productivity Change Across Plants Differing in Initial Productivity

This table presents estimates of the impact of anti-recharacterization laws on productivity across plants differing in initial productivity one year before the treatment. Each plant is classified as productive or unproductive depending on its within-firm ranking one year before the treatment. Productive (unproductive) plants fall above (below) the median of the productivity measure of the plants belonging to the same firm one year before the treatment. The unit of observation in each regression is a plant-year pair. *ARL* is an indicator variable that equals one if a firm is headquartered in a treated state between 1997 and 2001 or incorporated in a treated state between 1997 and 2003. The dependent variables in columns [1] to [2], and [3] to [4], are new machinery expenditures over total payroll and total factor productivity, respectively. Control variables include size and age of the plant as well as the number of plants owned by the firm. All variables are defined in Appendix A. Standard errors (in parentheses) are clustered at the state of location level. ***, **, and * denote statistical significance at the 1, 5, and 10 percent levels, respectively.

Dependent Variable:	*New Machinery Over Total Payroll*		*Total Factor Productivity*	
	[1]	[2]	[3]	[4]
ARL × *Unproductive*	0.031**	0.041**	0.061***	0.052***
	(0.015)	(0.017)	(0.016)	(0.020)
ARL × *Productive*	0.017	0.016	0.004	0.003
	(0.015)	(0.015)	(0.014)	(0.013)
Control Variables	Y	Y	Y	Y
Plant Fixed Effects	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y
State of Incorporation Fixed Effects	Y	Y	Y	Y
State of Headquarters Fixed Effects	Y	Y	Y	Y
State of Location-Industry-Year Fixed Effects	N	Y	N	Y
Rounded N	80,000	80,000	80,000	80,000
R^2	0.51	0.54	0.85	0.86

CHAPTER 3

CREDITOR CONTROL RIGHTS AND RESOURCE ALLOCATION WITHIN FIRMS

A central topic in financial economics is how the allocation of cash flow and control rights among the suppliers of corporate finance should evolve with firm performance. Theoretically, allowing for a state-contingent transfer of control to creditors can alleviate agency problems resulting from the separation of ownership and control, as well as conflicts of interest between debt and equity holders (Jensen and Meckling, 1976). Empirical evidence confirms that governance by creditors not only has profound effects among bankrupt firms (Gilson, 1990), but it also extends to a broad spectrum of firms through technical default. Debt covenant violations shift control rights to creditors, which, given their right to demand immediate repayment, puts them in a strong position to influence corporate financing and investment decisions (Chava and Roberts, 2008; Roberts and Sufi, 2009a).[1] Strikingly, this shift in control rights leads to improvements in operating performance that ultimately benefit shareholders, consistent with a positive role for creditors in corporate governance when firm performance deteriorates (Nini et al., 2009, 2012).

In this paper, we shed further light on the role of creditors in corporate governance among firms outside of bankruptcy. In particular, we document the precise channels of resource allocation driving the turnaround in operating performance among firms in technical default.[2] Our empirical tests are based on comprehensive establishment-level data from the U.S. Census Bureau (henceforth, Census). These data provide us with disaggregated information on the internal organization of firms, permitting an analysis of the within-firm reallocation and restructuring activities surrounding covenant violations. We focus on a sample of covenant

[1] Lenders may use the threat of calling the loan to indirectly influence firm decision-making through several mechanisms: waivers contingent on borrower improvements in financial condition, constraints on credit availability (Beneish and Press, 1993), additional contractual restrictions including hard limits on capital expenditures (Nini et al., 2009), or enhanced monitoring of financial statements or collateral (Gustafson et al., 2016). In addition, directors appointed after covenant violations often have connections to lenders, and are subsequently more likely to implement creditor-friendly policies (Ferreira et al., Forthcoming).

[2] For example, in the 2016 10-K filing of Ignite Restaurant Group, "forebearing lenders" were acknowledged as having discussions with management in their "pursuit of various strategic alternatives" to "enhance and preserve liquidity" and "improve our capital structure." These strategic alternatives included closing underperforming restaurants, selling noncore assets, reducing labor, marketing, and operating expenses, eliminating new restaurant development, and reducing capital expenditures to maintenance levels.

violations disclosed to the Securities and Exchange Commission (SEC) covering all publicly traded U.S. nonfinancial corporations. We link each of these firms to its constituent establishments over time and measure resource allocation using establishment-level employment, investment, and closure rates. We estimate the dynamic impact of covenant violations at both the firm and establishment levels by comparing changes in behavior before and after violations between violators and nonviolators, while controlling flexibly for both levels and trends in firm performance metrics (Roberts and Sufi, 2009a).

We initially document significant effects of covenant violations on firm-level outcomes, including reductions in employment and labor costs, and a greater frequency of establishment closures. The magnitude of these changes are large: for example, we find a typical firm reduces the number of employees by roughly five percentage points following a violation (about 12.5% of its unconditional standard deviation). We then turn to the establishment-level data to investigate the within-firm effects of the shift in control rights and its potential connection with improvements in violating firms' operating performance. Our analysis focuses on important establishment attributes that are motivated by the literature on agency problems and inefficient resource allocation within conglomerate firms: first, whether an establishment operates in a core or peripheral industry of a firm, and, second, establishment productivity.[3]

Our key findings can be summarized as follows. First, we find resources are withdrawn to a greater extent from establishments operating in peripheral industries. Violating firms lay off more employees at continuing peripheral establishments and, along the extensive margin, shutter them more often, relative to those within their core industry focus. This suggests that refocusing operations is a channel through which stronger creditor rights induce performance improvements.

Second, following covenant violations, firms' operations retrench from relatively unproductive establishments. To establish this result, we focus on the set of manufacturing firms for which the Census provides highly detailed information on factor inputs and output. This richness enables us to construct an array of establishment-level productivity measures—including total and individual labor and capital factor productivities—that we estimate both parametrically and non-parametrically. We find that violating firms cut employment and investment at, and close down more often, establishments classified as unproductive. Thus, resource withdrawal from relatively unproductive units is a second contributing factor to the improvement in firm performance.

[3]Shleifer and Vishny (1997) and Stein (2003) survey the literature on corporate governance and agency problems within conglomerates. These surveys highlight the potential spillovers of entrenched managers' preferences to firm performance. For example, "quiet life" managers might be slow to fire workers or shutter underperforming plants (Bertrand and Mullainathan, 2003). Alternatively, "grandstanding" or "empire building" managers might operate firms at a suboptimal scale or scope (Williamson, 1964; Gompers, 1996).

Third, we investigate the role of establishment operating risk. Given that creditors are exposed to losses on the downside, naturally we might expect them to push for risk reduction after the transfer of control rights. Measuring operating risk based on time-series and cross-sectional variation in establishment outcomes (e.g., operating margins), we find robust evidence that violating firms withdraw resources from riskier units. However, once we characterize how establishment risk and productivity interact, we observe cuts occurring almost exclusively among establishments classified as both risky and unproductive. Taken together, our evidence indicates that the active role played by creditors after covenant violations can benefit both the creditors and shareholders of violating firms by reducing default risk and improving economic efficiency.

Finally, we explore how these internal reallocation effects vary in the cross-section of lenders to provide evidence of an underlying mechanism. Creditors may contribute to operational improvements among firms in technical default if lenders offer expertise and experience when monitoring and advising. We find evidence consistent with this mechanism. Specifically, for each borrower, we measure lead lenders' industry specialization according to whether they have other loans outstanding or, alternatively, are a market leader in terms of lending to its industry. We then document that, using either measure, only covenant violations in which the lead lender has prior industry experience exhibit the within-firm resource reallocation effects described above. Thus, key lenders appear to bring industry-specific turnaround skill to bear on violating firms' operations.

Our findings contribute to empirical research on the importance of creditors in corporate governance, which builds on theoretical work analyzing optimal debt contracting in the presence of agency problems (e.g., Jensen and Meckling, 1976). Earlier work has argued that regulatory and legal impediments—including prohibition of large equity investments and the threat of having their claims equitably subordinated in bankruptcy or litigation under lender liability laws—may limit the scope for creditor intervention outside of default states (Gilson and Vetsuypens, 1994). Prior empirical research therefore emphasizes creditor control through debt restructuring when borrowers are bankrupt (Gilson, 1990; Gilson et al., 1990; Wruck, 1990; James, 1995, 1996), including modern evidence on the role of non-bank lenders (Jiang et al., 2012; Ivashina et al., 2016). More recently, Nini et al. (2012) among others, provide evidence suggesting a more active role for creditors in corporate governance outside of contracting and bankruptcy states. They argue that, following covenant violations, creditors are in a stronger position to influence firm decision-making and show that the

transfer of control rights improves operating performance and firm value.[4,5] Our micro-evidence provides support by showing that these performance improvements are driven, at least in part, by a redeployment of resources away from relatively unproductive and risky establishments, as well as those operating outside of the firm's core competency.

We identify sources of efficiency gains that are strikingly similar to those associated with major equity-centered governance interventions, notably, mergers and acquisitions (Li, 2013; Maksimovic et al., 2011), private equity (PE) transactions (Davis et al., 2014), and hedge fund activism (Brav et al., 2015). However, while the operational adjustments surrounding these interventions are similar, it is important to recognize that the types of firms violating covenants look very different from those targeted by activist shareholders. For example, hedge fund activist targets are mostly mature and generating free cash flow, whereas firms in technical default tend to be cash-strapped and underperforming. Moreover, on the financial side, hedge fund targets subsequently increase leverage and dividends, whereas firms in technical default do the opposite (Nini et al., 2012). Our findings therefore suggest that despite the fact that equity-centered and creditor-centered governance might be suitable for different firm types or firms at different stages in their life-cycle, the effects of these interventions for capital reallocation and restructuring are quite comparable.

More broadly, our paper relates to the literature on creditor rights and firm outcomes, including risk-taking. In a cross-country analysis, Acharya et al. (2011) find that firms in creditor-friendly bankruptcy regimes have lower leverage and cash-flow risk. In the U.S. context, Eisdorfer (2008) finds evidence of risk-shifting among financially distressed firms, whereas Gilje (2016), in the context of the oil and gas industry, finds that firms with bank loans featuring stricter financial covenants reduce investment risk (i.e., exploratory drilling) as they approach bankruptcy. Prior studies show that covenant violations are followed by conservatism in capital structure (Roberts and Sufi, 2009a), investment (Chava and Roberts, 2008; Nini et al., 2009), employment (Falato and Liang, 2016), and R&D (Chava et al., 2016). Our unique contribution to this literature is to provide granular evidence on the within-firm effects of covenant violations for employment, investment, and asset disposals, as well as how these reallocation decisions relate to several important establishment attributes. Importantly, our results suggest that lenders offer advice and expertise, which enables firms

[4]They show a turnaround in the ratio of operating cash to assets of about 7% in the year following the violation, an effect driven by a reduction in operating costs of between 5% and 10%. Violating firms' stock returns (risk-adjusted) rebound at a rate of 5% per year within three months of the violation.

[5]Theoretically, creditor control may be value-improving for underperforming firms, since creditors' concave payoff structure gives them sharper incentives to monitor and constrain inefficient managers or reduce excessive risk-taking (Aghion and Bolton, 1992; Dewatripont and Tirole, 1994; Zender, 1991). In the presence of agency conflicts between management and outside investors, creditor discipline may therefore increase the value of *both* debt and equity.

to turn performance around through improvements in resource allocation and productive efficiency. These findings contrast with a narrow view of stronger lenders bargaining solely for risk reduction to protect their short-term interests.[6]

3.1. Data and Empirical Methodology

3.1.1. Data sources

Our firm-level data comes from Compustat. This database contains balance sheet and income statement data for publicly traded U.S. corporations, which are the focus of this study. We gather a large number of standard accounting variables primarily to be used as control variables in our analysis. Our sample covers the period from 1996 to 2009. Following Nini et al. (2012), for a firm-year to be included in the sample, we require non-missing data on total assets, total sales, common shares outstanding, and closing share price. We exclude (financial) firms with Standard Industrial Classification (SIC) codes between 6000 and 6999, as well as firms with book value of assets less than $10 million.

We use three establishment-level data sets provided by the Census. First, we use the Longitudinal Business Database (LBD), which annually tracks all business establishments in the United States with at least one paid employee. It provides longitudinal identifiers as well as data on the number of employees, payroll, location, and industry for each establishment. The LBD also records corporate affiliation, allowing us to identify establishment closures.

The Census of Manufactures (CMF) and Annual Survey of Manufactures (ASM) provide greater detail on activities for the subset of manufacturing establishments (SIC codes between 3000 and 3999). The CMF is a survey conducted every five years (years ending 2 and 7) and consists of all manufacturing establishments in the United States with at least one paid employee. The ASM is another survey conducted in non-census years (i.e., when the CMF is not conducted) for a subset of these manufacturing establishments. This includes all establishments with greater than 250 employees and some with fewer employees, which are selected with a probability positively correlated with size. Reporting for both of these surveys is mandatory and misreporting is penalized, so the data is of the highest quality. Both the CMF and ASM include information on industry, corporate affiliation, output (total value of shipments), employment, capital expenditures, and on material inputs of each establishment. The level of detail of these manufacturing data sets helps us construct various measures of

[6]Other research argues that maintaining a relationship with the borrower as a going concern may be valuable to the bank due to reputation costs of default (Gopalan et al., 2011) or future lending and cross-selling opportunities (Bharath et al., 2007).

productivity for each manufacturing establishment.

We use the longitudinal identifiers in LBD to merge the CMF and ASM. We then use the Compustat-SSEL bridge maintained by the Census to match each firm in Compustat to its establishments. The Compustat-SSEL bridge ends in 2005, so we extend the match to 2009 using employer characteristics including name, address, and employer identification number.

Our primary data on financial covenant violations is kindly provided online by Nini et al. (2012).[7] This is a quarterly data set that contains an indicator variable defining whether each firm-quarter in Compustat has violated a financial covenant. All companies with registered securities are required to disclose covenant violations in quarterly filings with the SEC under Regulation S-X (Roberts and Sufi, 2009a; Beneish and Press, 1993). The authors use a combination of textual analysis and hand collection to carefully identify firms reporting a covenant violation. Their approach captures about 90% of actual reported violations. This data set begins in 1996—the first year in which electronic filing with the SEC became mandatory—and ends in 2009, which explains our choice of sample window.

In robustness tests, we use alternative measures of covenant violations based on loan contract terms at origination from Reuters' Loan Pricing Corporation's Dealscan database (henceforth, Dealscan) following Chava and Roberts (2008). Dealscan provides a large sample of loan contracts, including detailed information on maintenance covenants based on accounting ratios, that we match to Compustat.[8] We assume firms are bound by a given covenant threshold as stated at origination until the loan matures and take the tightest covenant at a given point in time.[9] In these tests, we restrict the sample merged to Compustat to firms having either net worth or current ratio covenants during the time period from 1996 until 2009. We focus on these covenants for two main reasons. First, Roberts and Sufi (2009a) show that more than 95% of loan contracts include at least one financial covenant, with the net worth (leverage) and current ratio covenants being among the most common. Second, determining whether a violation has occurred or not for these two covenants is straightforward, since the corresponding accounting variables are standard.

[7]These authors provide an excellent description of covenants in corporate credit agreements, including specific examples of violations from SEC filings. They argue that covenants, while common in most debt contracts, are most prevalent and often binding in bank loans (see also Taylor and Sansone, 2007).

[8]Thanks to Sudheer Chava and Michael Roberts for providing the Dealscan-Compustat link.

[9]Two caveats apply. First, firms may have overlapping deals, i.e., the first deal matures after the start of the second deal. Second, covenant thresholds can change over the tenure of the loan in a predetermined manner or, say, due to a renegotiation or refinancing of the deal. We address these challenges following Chava and Roberts (2008) (see their Appendix B). We assume firms are subject to a given covenant threshold for the longest maturity of all loans in each package and take the most restrictive covenant across packages.

3.1.2. Variable construction and summary statistics

Our main dependent variable is a measure of employment, which we use to capture how firms allocate resources. We focus primarily on employment because of the completeness of the data provided in the LBD. In most tests, employment is measured as the annual change in the natural logarithm of the number of employees. At the establishment level, the number of employees comes directly from the LBD. At the firm level, the number of employees is summed across all of the firm's establishments.

We consider additional employment measures for robustness and also to better understand the channels through which firms adjust resource allocation and potentially achieve cost improvements (i.e., reducing labor costs through the number of employees or wages per employee). We use four such measures based on data from the LBD. First, the annual change in the natural logarithm of payroll. Second, the symmetric growth rate of employment, calculated by dividing the annual change in number of employees by the average of current and lagged number of employees. This measure accommodates both entry and exit as well as limiting the effects of extreme values (Davis et al., 1998). For the third and fourth measures, we use the change in the number of employees and in payroll scaled by the average of current and lagged book value of assets, respectively.

We also analyze establishment closure rates. Such closures represent an extreme form of resource withdrawal that may be less likely to occur absent outside pressure (Bertrand and Mullainathan, 2003). We use longitudinal identifiers from LBD to define for each establishment in year t, a closure indicator variable that is set equal to one if the establishment is closed down in year $t + 1$. This is a dependent variable in the establishment-level analysis. For the firm-level analysis, we use indicator variable set equal to one if the firm closes any of its establishments in a given year.

In some tests we analyze the investment decisions of manufacturing firms based on data from the CMF and ASM. We calculate investment as the annual change in establishment-level capital expenditures scaled by the establishment-level capital stock. Establishment-level capital stock is estimated using the perpetual inventory method following Brav et al. (2015).

Our main independent variable is an indicator set equal to one if a firm violates a covenant in the current year. These violations are considered material information and must be disclosed in SEC filings. We aggregate the quarterly violation data to the annual frequency of the Census data. In light of this data constraint, we take a conservative approach when we measure the occurrence of a violation. To code a firm-year as a violation, we require a violation in at least one quarter of the current year and non-missing covenant information without any violation in all four quarters of the previous year. Effectively, we focus on new covenant violations—those occurring in the current but not the previous year—which is a

cleaner setting to observe the effects of creditor influence (e.g., Nini et al., 2012).

To complement our main approach, we also measure covenant violations based on at-origination loan contract terms (i.e., maintenance covenant thresholds) from the Dealscan data set. We focus on current ratio and net worth covenants due to their ubiquity and standardization. A covenant violation occurs in a given firm-year when the realized current or net worth ratio falls below the threshold specified by either covenant. As an additional robustness test, we restrict the sample to firm-year observations close to the threshold and conduct a regression discontinuity design (RDD) in the spirit of Chava and Roberts (2008). We discuss the identification assumptions underlying this test in the next section.

We include in our regressions firm-level accounting ratios on which covenants are written, as well as variables to account for systematic differences between violator and nonviolator firms that could affect decision-making. We control for operating cash flow, leverage ratio, interest expense scaled by average assets, net worth over total assets, current ratio, and market-to-book ratio. These variables are winsorized at the 1% and 99% levels to limit the effects of outliers. In the establishment-level analysis, we further control for establishment age, the number of establishments per firm, and the number of establishments per three-digit industry segment of the parent firm. Appendix A.2 defines all variables precisely.

With our data restrictions in place, particularly the Compustat-SSEL link, we construct a final sample containing 21,000 firm-year observations covering approximately 2,000,000 establishment-years for the period from 1996 until 2009. Table 3.1 presents summary statistics for the full sample, as well as the subsamples of covenant violators and nonviolators.[10] The firm-level summary statistics are similar to Nini et al. (2012), reassuring us that sample selection resulting from the Compustat-Census match is not a problem. This is not surprising given the administrative nature of the Census data—that is, it should cover the universe of Compustat firms. New covenant violations occur in 6.3% of firm-year observations.

Comparing violators with nonviolators motivates our main results and empirical approach. Notably, both at the firm and establishment levels, the change in employment is larger for violators than for the rest of the sample. In addition, establishments belonging to violating firms experience closures with greater frequency. However, there appear to be significant performance differences between violators and nonviolators: violators have lower net worth, current ratio, and market-to-book ratio; hold less cash; and are more levered. To ensure that our results do not simply reflect differences in these characteristics, it is crucial that we control flexibly for them in our regression framework. We also conduct several falsification and sensitivity tests to ensure that our results do not reflect systematic differences or differences

[10] As per Census disclosure requirements, we round off the number of observations in each table and quantile values are not reported in any summary statistics table.

in trends among violators and nonviolators.

Finally, it is worthwhile noting the differences between the LBD establishments (Panel B) and the subsample of manufacturing establishments from the CMF and ASM (Panel C). The rate of covenant violations is about the same for manufacturing (0.040) compared with all other establishments (0.041). Where manufacturing firms differ is that they tend to own fewer and older establishments. We control for these differences throughout our establishment-level analysis, including tests that focus specifically on manufacturing firms.

3.1.3. Identification and empirical model

We adapt the empirical methodology of Roberts and Sufi (2009a) and Nini et al. (2012) to our setting. To examine the firm-level implications of covenant violations, we estimate the following equation for the annual change in (log) employment:

$$\begin{aligned}\Delta y_{i,t+1} \;=\; & \alpha_t \;+\; \alpha_k \;+\; \beta\, Covenant\ Violation_{it} \\ & + \gamma_1\, Covenant\ Controls_{it} + \gamma_2\, Covenant\ Controls_{i,t-1} \\ & + \gamma_3\, Higher\text{-}Order\ Covenant\ Controls_{it} + \epsilon_{it}, \end{aligned} \tag{3.1}$$

where i indexes firms, t indexes years, and k indexes industries. The unit of observation is a firm-year. The dependent variable, $\Delta y_{i,t+1}$, is primarily the within-firm annual change in the natural logarithm of the number of employees.[11] The main independent variable, *Covenant Violation*$_{it}$, is an indicator variable equal to one for a new covenant violation. The α_t and α_k denote year and industry (based on three-digit SIC codes) fixed effects, respectively. The industry fixed effects control for time-invariant differences between industries and the year fixed effects control for aggregate economic shocks. The error term, ϵ_{it}, is assumed to be correlated within-firm and potentially heteroskedastic (Petersen, 2009).

The set of variables labeled *Covenant Controls*$_{it}$ are included to account for variables on which covenants are written as well as those that may have an independent effect on employment and, more broadly, resource allocation decisions. These include operating cash flow, leverage ratio, interest expense scaled by average assets, net worth over total assets, current ratio, and market-to-book ratio. These variables are the most common ratios included in financial covenants (Roberts and Sufi, 2009a), as well as predictors of firm employment outcomes (Nickell and Wadhwani, 1991). These variables are included linearly, squared, and cubed, as indicated by the higher-order covenant controls term, as well as their one-year lag.

[11] Census employment variables are measured as of March 12 each year. For this reason, if a violation occurs in the first or second (third or fourth) quarters of year t, we measure the annual change in employment from year t to $t+1$ ($t+1$ to $t+2$).

The coefficient of interest, β, measures how a firm's employment responds in percentage point terms to a new covenant violation. If firms reduce employment to improve net cash flows and satisfy creditors worried about the value of their claims, the coefficient β will be strictly negative. The null hypothesis that covenant violations are irrelevant for employment (because firms can find substitute financing or creditors cannot influence operations) corresponds to expecting that β will be zero.

The main identification challenge in the estimation of β is to separate out the effect of violations from expected changes in resource allocation based on differences in financial performance and other fundamentals between violators and nonviolators. Our approach addresses this challenge through a comparison of firms close to the covenant threshold by controlling flexibly for continuous functions of the underlying variables—on which covenants thresholds are contracted upon—and utilizing the discontinuous change in firm behavior occurring at the time of a violation (Roberts and Sufi, 2009a; Nini et al., 2012). In effect, the outcomes of violations are measured by comparing firms with similar pre-violation performance and thus a similar expected time-series path of outcomes. Specifically, we take the within-firm annual difference in dependent variables, which sweeps out fixed differences in outcomes between violators and nonviolators. We also flexibly control for contemporaneous and lagged firm-level covenant control variables known to affect outcomes, as described above, and thus control for pre-violation trend differences between violators and nonviolators.

We complement our baseline approach with a standard RDD that incorporates the actual contractual level of covenants (Chava and Roberts, 2008). The RDD essentially compares firms that just violate covenants to those that closely avoid doing so. We focus on the net worth and current ratio thresholds and define a firm-year to be in violation if the observed accounting ratio falls below the threshold specified by the contract. Thus, the covenant violation is a discontinuous function of the distance between the accounting ratio and the threshold, which constitutes the basis of the RDD approach.[12] We use this alternative definition of a violation in two sets of robustness tests. The first simply uses it as a substitute independent variable in equation (3.1). The second restricts the sample to firm-year observations within a reasonably tight window, say, $\pm 10\%$, around the covenant threshold. In this case, a violation can plausibly be considered as good as random. The RDD approach offers two key advantages. First, it allows us to tackle borrower selection into loan contracts

[12]The RDD uses "locally" exogenous variation in violations arising from the distance to the threshold. The main identification assumption is local continuity, which amounts to continuity of all factors besides the violation through the covenant threshold. This requires that firms cannot perfectly sort themselves on one side of the threshold (Lee and Lemieux, 2010). In our context, this would require that firms manipulate accounting ratios to avoid violations, an outcome mitigated by the institutional features of the U.S. loan market (Chava and Roberts, 2008).

and covenant thresholds at origination. In particular, the analysis is conditional on firms receiving similar covenants in their contracts. We can also control for the the distance to covenant thresholds at origination (e.g., covenant strictness, see Murfin, 2012) and at the time of technical default. Doing so mitigates the concern that covenant strictness conveys information about investment opportunities. Second, using a narrow bandwidth around the threshold ensures the covenant violation is close to a random event and thus unlikely to correlate with firm characteristics (Bakke and Whited, 2012).[13]

Analyzing the firm-level response to covenant violations can mask important operational changes within the firm. To better understand the channels through which the transfer of control rights might affect operating performance, we examine establishment-level data. While firms' establishments differ across several important dimensions, we focus on two characteristics that have been emphasized by the literature on resource allocation within conglomerates (e.g., Stein, 2003; Maksimovic and Phillips, 2008): establishment productivity and whether it operates in a core or peripheral industry of a firm. We also examine the role of establishment-level operating risk in determining the resource allocation decision. This analysis is based on the full sample of establishments covering all industries based on the LBD and the subsample of manufacturers based on the CMF and ASM. In the latter sample, we have detailed establishment data on investment, performance, and operating risk.

To examine the effect of violations on resource allocation across establishments within the same firm, we estimate a modified version of (3.1) following Giroud and Mueller (2015):

$$\begin{aligned}\Delta y_{ij,t+1} \;=\; & \alpha_i \;+\; \alpha_{k(j)} \;\times\; \alpha_{s(j)} \;\times\; \alpha_t \;+\; \beta_1 \; \textit{Covenant Violation}_{it} \times \textit{Yes}_{jt} \\ & +\; \beta_2 \; \textit{Covenant Violation}_{it} \times \textit{No}_{jt} \;+ \gamma_1 \; \textit{Establishment Controls}_{jt} \\ & +\; \gamma_2 \; \textit{Covenant Controls}_{it} \;+\; \gamma_3 \; \textit{Covenant Controls}_{i,t-1} \\ & + \gamma_4 \; \textit{Higher-Order Covenant Controls}_{it} + \epsilon_{ijt}, \end{aligned} \tag{3.2}$$

where i, j, $k(j)$, $s(j)$, and t index for firms, establishments, industries, and states of the respective establishments, and years, respectively. The unit of observation is an establishment-year. The dependent variable, $\Delta y_{ij,t+1}$, is the within-establishment annual change in resource allocation. Depending on the data source, this could be employment, investment, or establishment closures. The main independent variable, $\textit{Covenant Violation}_{it}$, is an indicator variable equal to one if an establishment's owner firm violates a covenant. The indicator

[13]The disadvantage of this approach is that the restricted RDD sample size renders much of our analysis infeasible, and we therefore choose specification (3.1) as our baseline model. While our baseline approach does not incorporate explicit covenant thresholds, we can proxy for the unobserved thresholds by including lags of the covenant controls. In support of this approximation, Chava and Roberts (2008) show that covenant violations tend to occur two years after origination, on average.

variable Yes_{jt} (No_{jt}) is set equal to one (zero) if the attribute under consideration is satisfied (not satisfied) by a given establishment at the beginning of year t. The set of variables labeled *Establishment Controls*$_{jt}$ include establishment age, the number of establishments per firm, and the number of establishments per segment. We continue to cluster standard errors at the firm level to account for dependence across establishments of the same firm.

The coefficients of interest are β_1, which captures the effect on the establishments with the attribute of interest, and β_2, which captures the effect on other establishments within the same firm. If firms reduce employment uniformly across establishments, then the coefficients β_1 and β_2 will both be negative and statistically indistinguishable. On the other hand, if β_2 is smaller than β_1, then the firm cuts employment more at establishments not satisfying the criterion (e.g., outside of the core industry focus of the firm). The null hypothesis is that covenant violations are irrelevant for establishment-level employment decisions, which corresponds to β_1 and β_2 both equal to zero.

3.2. Empirical Results

3.2.1. Covenant violations and firm-level outcomes

Table 3.2 shows the firm-level effect of new covenant violations on the employment outcomes of violators and other firms. Column [1] presents results from estimating equation (3.1) with only industry and year fixed effects. We see that the coefficient of interest on *Covenant Violation*$_{it}$, β, is -0.063, and it is statistically significant at 1% confidence level. The direction of this estimate is consistent with our expectation that following covenant violations firms lay off employees to improve net cash flows and satisfy creditors' concerns. In terms of economic magnitudes, the estimate implies that a typical covenant violation is associated with a 6.3-percentage-point decrease in the number of employees, which constitutes about 15.7% of its standard deviation (0.401) among the full sample of firms.

Column [2] adds covenant control variables, namely, operating cash flow, leverage, interest expense, net worth, current ratio, and market-to-book ratio. As expected, their inclusion lowers the estimated coefficient of interest as the comparison group has similar (weak) performance to violating firms. The estimate drops to -0.042, remains significant at the 1% level, and continues to be large in economic terms. Column [3] further includes lagged covenant controls to account for pre-violation trend differences between violators and nonviolators. The coefficient of interest remains essentially the same in terms of size and significance. Column [4] shows that when we add covenant controls both squared and raised to the third power—which allows us to control more flexibly for the firm fundamentals—the result re-

mains unchanged.

We next examine whether covenant violations lead firms to withdraw resources on a larger scale through establishment closures. We identify closures through establishment longitudinal identifiers in LBD. We define a firm-level variable, *Any Establishment Closure*$_{i,t+1}$, equal to one if a firm closes any establishment from year t to $t+1$ (and zero otherwise) and estimate (3.1) as a linear probability model. Column [5] shows a point estimate is 0.024, significant at the 5% level, which indicates a violating firm is 2.4 percentage points more likely to close an establishment than a nonviolator. This estimated effect is moderate given the coarse measurement of closures at the firm level: about 50% of all firms close an establishment in a given year.[14] We shall see our estimates become sharper and more economically meaningful in our establishment-level analysis.

Overall, these estimates indicate that loan covenant violations have an economically large and statistically robust impact on firm-level labor outcomes. Our baseline estimates indicate a cut in the number of employees among violating firms on the order of four to six percentage points relative to nonviolators. Given the frequent occurrence of covenant violations and contract renegotiations (Roberts and Sufi, 2009b), these estimates suggest that creditor influence might be an important determinant of employment outcomes.

Our findings line up quite well with existing estimates from the literature relying on other data sources. Falato and Liang (2016) use data on the number of employees from Compustat and hand-collected layoff announcements to estimate a 10% reduction in the workforce among firms in technical default. Moreover, our estimates are quite reasonable in magnitude when compared with less frequent, more severe financial distress events such as bond defaults and bankruptcy filings, which exhibit layoffs of 27% and 50%, respectively (Agrawal and Matsa, 2013; Hotchkiss, 1995).

3.2.2. Internal resource allocation: Establishment-level analysis

3.2.2.1. Establishments operating in core and peripheral business lines

From this point on, we analyze the effects of creditor control on resource allocation among establishments belonging to the same firm. We first test for a heterogeneous response among establishments operating in core and peripheral business lines. Since peripheral business lines are outside the main scope of the firm, these activities may be less developed, could arise from managers' private incentives, or management may lack experience relative to core business lines (e.g., Gompers, 1996; Scharfstein and Stein, 2000). Thus, withdrawing resources from

[14] In unreported results, we find a positive and statistically significant relation between covenant violations and the percentage of establishments closed in the subsequent year.

these establishments and refocusing may improve operating efficiency and decrease the risk of failure, thus improving firm performance and value (e.g., Lang and Stulz, 1994; Schoar, 2002). On the other hand, diversification from an operational standpoint could increase the value of debt—provided cash flows are not perfectly correlated (i.e., a "coinsurance" effect, as in Lewellen, 1971)—in which case we might see no change in focus.

To test for the importance of industry focus in resource allocation, we turn to the establishment-level data from LBD. We follow Maksimovic and Phillips (2002) and, for each firm, classify a three-digit SIC industry as core (peripheral) if its payroll summed across establishments is more (less) than 25% of the firm's total payroll. Each establishment within the firm is characterized as core or peripheral based on its industry classification. We then estimate our establishment-level regression model (3.2) allowing for differential sensitivities among establishments operating in the firm's core or peripheral business lines following a new covenant violation. The estimated coefficients on $Covenant\ Violation_{it} \times Core_{jt}$ and $Covenant\ Violation_{it} \times Peripheral_{jt}$ measure these heterogeneous responses. Table 3.3 shows the results.

In columns [1] to [4] the dependent variable is the establishment-level change in the natural logarithm of the number of employees. In column [1], we perform the estimation without any covenant controls and find that covenant violations result in a decrease in employment of 2.7 percentage points in core establishments and 8.4% in peripheral establishments. Both point estimates are significant at conventional levels. In column [2], we add covenant controls and the coefficients of interest are estimated to be -0.026 and -0.090, still statistically significant at conventional levels. Columns [3] and [4] include further controls but the finding does not change: firms decrease employment significantly at both core and peripheral establishments, but the effect is about twice as large at peripheral establishments.[15]

Column [5] reports results from regressions where the dependent variable is an indicator variable for establishment closure. In this case, the dependent variable is equal to one if the establishment is closed in the subsequent year and zero otherwise. Here, a similar pattern emerges: the coefficients of interest are significantly positive for both types of establishment, but the coefficient for peripheral establishments is much larger (0.013 versus 0.039). Once again, this difference is statistically significant at the 1% level based on an F-test.

Table 3.4 further examines the robustness of these results to our classifications of core and peripheral industries. We conduct two tests. First, in columns [1] and [2], we use finer information on establishment industry codes to classify industries. In particular, we focus on four-digit SIC codes and maintain the 25% threshold (e.g., Giroud and Mueller, 2015).

[15]We test whether these coefficients are statistically distinct using F-tests. In each case, we find the difference between coefficients is significantly different from zero at 1% confidence level.

In columns [3] to [4], we maintain the use of three-digit SIC codes but now adopt a 50% payroll threshold to classify industries within a firm as core or peripheral. For both sets of tests, we find very similar results relative to Table 3.3, indicating that this finding is not an artifact of our industry classification scheme.

Overall, these establishment-level results indicate a large withdrawal of resources from violating firms' operations, particularly, establishments operating in peripheral industries. Specifically, following covenant violations, firms decrease employment more at their continuing peripheral establishments and, along the extensive margin, close them significantly more often. Thus, our findings suggest that increasing the focus of firms' operations following covenant violations is an important channel through which creditor control may improve firm operating performance and market valuations.

3.2.2.2. Establishment productivity

We next analyze the effects of covenant violations on within-firm reallocation across productive and unproductive establishments. If operating performance improves, then, naturally, we expect managers to withdraw resources from less productive establishments.

We focus primarily on the sample of manufacturers using the CMF and ASM. These data provide detailed information on manufacturing establishments, including output and factor inputs, allowing us to construct an array of productivity measures. We can measure total, labor, and capital productivity several ways both parametrically and nonparametrically, which gives us confidence that measurement error is not driving our results. We first use total factor productivity (TFP) to estimate establishment productivity. We follow the literature to compute TFP using Census data (e.g., Foster et al., 2008). TFP is estimated as the difference between actual and predicted output, where the latter is estimated using a log-linear Cobb-Douglas production function with capital, labor, and materials as inputs.

We rank establishments on the basis of their within-firm productivity ranking—productive (unproductive) establishments fall above (below) the median of TFP of the establishments belonging to the same firm in a given year—and consider the within-industry ranking later in a robustness test.[16] Given the richness of the manufacturing data, we examine effects of covenant violations on establishment-level investment, in addition to employment and closures. To implement our tests, we estimate (3.2) allowing high and low productivity establishments to display different sensitivities of establishment outcomes to violations.

Table 3.5 shows the within-firm effects of productivity on employment and closures. In columns [1] to [8], the dependent variable is the annual change in the natural logarithm of

[16]If industry production is heterogeneous in terms of capital, labor, and total factor productivity, then within-firm productivity rankings might be misleading, especially for firms spread across several industries.

the number of employees. Column [1] indicates that firms cut employment at both productive and unproductive establishments, although layoffs are considerably larger at unproductive establishments. The coefficients show a decrease in number of employees of 5.7 and 19.0 percentage points for productive and unproductive establishments, respectively. As we introduce covenant controls, the estimated effect on productive establishments diminishes in size and statistical significance. In column [4], with the full set of controls, layoffs at productive establishments are indistinguishable from zero. In contrast, unproductive establishments experience employment cuts that are large and statistically significant at the 1% level. Furthermore, F-tests confirm that the difference in the estimates between productive and unproductive establishments is always statistically significant at conventional levels.

We next examine the robustness of employment outcomes to alternative measures of productive efficiency. In column [5], we consider a within-industry (three-digit SIC code) TFP ranking of establishments and find a similar result as compared to using the within-firm productivity ranking. The estimates indicate that following a violation firms decrease the number of employees at unproductive establishments by 14.3 percentage points, whereas the change in employment at productive establishments is statistically insignificant.

We consider three more refined measures of labor productivity commonly used in the literature (e.g., Brav et al., 2015). First, in column [6], we use value-added per labor hour, which is total value of shipments minus material and energy costs divided by total labor hours. Second, in column [7], we use output divided by total labor hours. Finally, in column [8], we use wage per hour. Each time, we use a within-industry productivity ranking to determine which establishments are relatively productive. It can be seen that following covenant violations, the withdrawal of labor resources occurs most strongly at establishments with low labor productivity. In contrast to the productive establishment interaction, the unproductive establishment interaction is always negative, larger in magnitude, and statistically significant at the 1% confidence level. Finally, in column [9] we examine establishment closures and find that, along the extensive margin, firms only close unproductive establishments. Here, we revert to the within-firm TFP ranking, as in column [1].

In Table 3.6 we uncover similar patterns for investment. We consider the investment rate as a dependent variable, which we measure as the annual change in establishment-level capital expenditures scaled by the establishment-level capital stock. Following covenant violations, violating firms cut the investment rate by between 2.0 and 2.7 percentage points at unproductive establishments, relative to the establishments of nonviolators. There is virtually zero effect on productive establishments. This pattern holds either for the within-firm TFP ranking (columns [1] to [4]) and the within-industry TFP ranking (column [5]).

In column [6] we proxy for capital productivity based on return on capital (ROC) (e.g.,

Giroud and Mueller, 2015), which has the advantage of being a simple and nonparametric measure. ROC is calculated as total value of shipments minus labor, material, and energy costs scaled by capital stock. Very similar results emerge: compared with the investment rate of nonviolator establishments, the investment rate decreases by 0.015 among violating firms' establishments with below-median within-firm ROC (significant at the 5% level) and indistinguishable from zero in the case of productive establishments.

We next analyze how establishment productivity and industry focus interact in the response of firms to covenant violations. Table 3.7 presents the results of estimating (3.2), further interacting these two establishment characteristics. Two key results obtain. First, we observe that the cuts occurring at manufacturing establishments outside of the core focus of violating firms are in line with the estimates for all industries (see Table 3.3). Second, on the interaction between focus and productivity, we see that the cuts occur among unproductive plants in both core and peripheral industries; however, they are far larger in magnitude at the peripheral establishments. For example, column [2] shows a 10.8 percentage point reduction in employment at *Core* $\times$ *Unproductive* establishments (significant at the 5% level), about half the size of the 22.5 percentage point cut at *Peripheral* $\times$ *Unproductive* establishments (significant at the 1% level). This finding is consistent with managers withdrawing resources primarily from less productive establishments, although the peripheral characteristic appears to play an important amplification role.

In summary, this evidence highlights the importance of establishment productivity in firm decision-making following covenant violations. We find strong evidence that violating firms cut employment and investment at unproductive establishments and close them down more frequently. Overall, the taking away of resources from and disposal of relatively unproductive establishments appears to be a second channel through which creditors facilitate the turnaround of violating firms and enhance their valuation.

3.2.2.3. Establishment operating risk

Next, we examine the importance of establishment operating risk for resource allocation decisions after the transfer of control rights to creditors. Risk-taking on the operational side might expose the firm to large potential losses. Management might undertake excessively risky investments due to a lack of information or skill. Alternatively, these operating decisions might be optimal from the perspective of shareholders who reap the gains on the upside, but at the expense of creditors who are exposed to the losses on the downside. Consequently, in the presence of shareholder-creditor conflicts of interest, creditors may prefer to shift resources away from projects that have high operating risk.

We construct industry-level measures of operating risk based on the variance of estab-

lishment outcomes. Following Maksimovic et al. (2011), our main measure of risk is the cross-sectional standard deviation of operating margins across manufacturing establishments in the same three-digit SIC code, where operating margins are calculated as the total value of shipments minus all input costs divided by the value of shipments. Operating margins can only be calculated using the CMF/ASM data, so we continue to focus on manufacturing establishments. We also wish to examine the interactions between operating risk and productivity, further necessitating the focus on manufacturers. For each three-digit SIC code-year, we calculate operating risk and classify an establishment as *Risky* if it belongs to an industry with above-median standard deviation of operating margins and *Safe* otherwise.

Table 3.8 presents the results of estimating equation (3.2) using a risk-based classification of establishments. In panel A, the dependent variable is the annual change in the natural logarithm of the number of employees. Columns [1] to [4] use our main measure of operating risk and indicate that layoffs are present only at risky establishments. The estimated coefficients show a decrease in number of employees of between 11.3 and 15.4 percentage points for risky establishments (always significant at the 1% level), whereas layoffs at safe establishments are indistinguishable from zero.[17]

The remaining columns of panel A use alternative measures of establishment operating risk for robustness. In column [5], we classify establishments as safe or risky instead based on the cross-sectional standard deviation of operating margins across Compustat firms at the three-digit SIC code level. Columns [6] and [7] uses the time-series standard deviation of the average industry operating margin at the three-digit SIC level based on Compustat firms using 5 and 10 years of data, respectively. Finally, in column [8] we use the time-series standard deviation of the average industry ratio of operating cash flows to assets. While using the establishment-level data allows for a cleaner measurement of which industries an establishment operates in and therefore its operating risk, we nevertheless find similar patterns in layoffs emerge based on firm-level measures. Finally, we find similar results when we instead examine establishment closure as a dependent variable in panel B. These findings collectively support the idea that creditor influence brings about a decline in operational risk-taking through a reallocation of resources following covenant violations and the transfer of control rights.

In Table 3.9, we characterize how establishment productivity and operating risk interact. We see very clearly that layoffs are concentrated among the establishments that are considered to be both unproductive and risky. For example, column [1] of panel A shows a 16.2 percentage point reduction in employment at *Unproductive* $\times$ *Risky* establishments (signif-

[17] F-tests indicate that the difference between risky and safe establishments point estimates is statistically significant at at least the 5% confidence level.

icant at the 1% level) and nowhere else. In this column we use our preferred measures of productivity and risk; however, this finding persists across the various alternative measures defined above. This large and statistically robust effect holds for establishment closures in panel B and is particularly stark for investment. Thus, while riskier operations experience cuts, resources are withdrawn from unproductive units and therefore are likely to benefit both creditors and shareholders by both reducing default risk and improving productive efficiency.

3.2.2.4. Cross-sectional heterogeneity in resource allocation effects

To strengthen the causal interpretation of our results, in this section we analyze how the resource allocation effects of covenant violations vary with in the cross-section of borrowers and lenders. We first consider borrowers characteristics, in particular, agency frictions and financial strength. Given the role of covenants in mitigating agency problems between management and outside investors (Tirole, 2010), we expect creditor influence to be more pronounced among firms with greater opportunity for managerial slack. In addition, the shift in control should matter more when creditors are in a stronger bargaining position with respect to management. For example, firms lacking outside financing options might be more likely to make operational changes to satisfy creditors.

To explore the importance of agency frictions, we employ industry-level measures of product market competition, based on the idea that managerial slack is more severe in industries that feature less discipline from competitors (e.g., Giroud and Mueller, 2010). We calculate product market competition using the Herfindahl Hirschman Index (HHI) at the four-digit SIC industry level, split industries at the median to classify establishments into competitive and noncompetitive groups, and repeat our establishment-level regressions. Consistent with covenant violations alleviating agency problems, in Panel A of Table 3.10 we observe a shift in resources away from peripheral, unproductive, and risky establishments only where competition is weakest.

In Panel B, we proxy for the strength of borrower bargaining position using financial slack, as measured by the presence of a credit rating. We use long-term credit ratings issued by S&P and recorded in Compustat and sort firms each year according to whether they have a rating or not. The point estimates show our benchmark establishment-level results are only present among firms without a credit rating.

We next identify heterogeneity among lenders. Lenders with experience may use their knowledge and turnaround expertise to offer advice and monitor operational improvements. Consistent with this idea, prior research has shown that some lenders specialize in extending credit to certain firms or markets (Boot, 2000; Paravisini et al., 2017), and this information

advantage may confer benefits to borrowers.[18] Moreover, specialized lenders—particularly those with a significant market share—may value successful turnarounds due to reputation costs of default or future lending and cross-selling opportunities (Gopalan et al., 2011; Bharath et al., 2007). We therefore test whether past lender industry experience and market share are associated with pronounced resource reallocation outcomes around covenant violations.

For each firm-year in our sample, we identify the names of lead lenders on active loans from Dealscan.[19] If a firm-year has more than one lead arranger—due to multiple lead arrangers per loan or multiple loans with unique lead arrangers—then we assign the lead lender that arranges the most credit across all deals.[20] For each lender-year pair, we characterize lending behavior across industries and construct two lender experience measures. First, we assign the variable *Industry Experience* a value of one if the lead arranger has active credit extended to at least one other firm in the same industry in the current year. Second, we consider the industry market share of the lead lender by cumulating active credit extended by each lead as a fraction of total credit outstanding to the industry over the previous year. We set the variable *High Share* equal to one if a given lead arranger has an above-median industry market share.[21]

In Table 3.11 we repeat our establishment-level analysis but now interacting establishment characteristics with the lender experience variables. The coefficients on the peripheral, unproductive, and risky establishment interactions have the expected sign and are statistically significant at conventional levels. This holds for changes in employment and establishment closures, as well as for both lender experience measures. Thus, only those firms in technical default whose main lender has industry experience exhibit reallocation effects that are consistent with operational improvements. These results suggest advice or enhanced monitoring by lenders with industry expertise is a channel for operational improvements among firms in technical default.

3.3. Conclusion

Using establishment-level data from the U.S. Census Bureau, we provide detailed evidence on how U.S. publicly traded corporations adjust their operations in response to debt covenant

[18] Acharya et al. (2012) and Bernstein and Sheen (2016) find that PE partners' past industry experience improves the performance of the portfolio company and the operating performance of PE-backed firms, respectively.

[19] Thanks to Michael Schwert for providing the Dealscan-Compustat link for lenders.

[20] Similar results obtain if we use the maximum experience in the case of multiple lead arrangers.

[21] Similar results obtain if we split lead lenders at the 75th percentile of market share.

violations. We first show that covenant violations are followed by significant employment cutbacks. A typical violating firm lays off between 4% and 6% of its labor force, as compared with similar nonviolating firms. Using the Census micro-data, we look inside the black box of the firm and document two patterns of within-firm resource allocation following covenant violations. First, we show that firms refocus the scope of their operations by withdrawing resources significantly more from peripheral establishments outside of the firm's core business lines. Second, total and individual factor productivities drive resource allocation, whereby violating firms pull resources entirely at unproductive establishments. These previously unexplored channels may explain, as least in part, the gains in violating firms' operating performance and valuations following violations (Nini et al., 2009, 2012). Finally, we show these changes are prominent when key lenders specialize in a borrower's industry, which is consistent with them offering expertise and knowledge when advising management.

Our results are consistent with a valuable role of creditors in corporate governance. Regulatory changes in the wake of the Great Recession and recent financial innovations may impede the ability of lenders to perform this role. Notably, stricter capital regulation and new liquidity requirements levied on banks increase the cost of originating and holding corporate loans, particularly long-term loans to risky borrowers that may benefit most from monitoring. In addition, the introduction of "covenant-light" loan contracts with weaker lender protection—namely, loans excluding maintenance covenants (Ivashina and Becker, 2016; Berlin et al., 2017)—may reduce the occurrence of covenant violations and potential creditor influence. Finally, relatively new credit risk transfer tools such as credit default swaps separate control rights from potential losses (Parlour and Winton, 2013), which may weaken incentives to intervene when borrowers violate covenants (Bolton and Oehmke, 2011; Chakraborty et al., 2015). Investigating the role of banks and other creditors in corporate governance in rapidly evolving, modern credit markets remains an exciting area for future research.

3.4. Tables

Table 3.1 Summary statistics

This table provides sample summary statistics. Panel A provides firm-level statistics. Panels B and C provide establishment-level statistics. The unit of observation in Panel A and Panels B and C, respectively, is a firm-year and establishment-year. All variables are defined in Appendix A.2

	Full sample			Nonviolators			Violators		
	N	Mean	Std.	N	Mean	Std.	N	Mean	Std.
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Panel A: Firm-level									
Δ Log(Employment)	21,000	-0.061	0.401	19,000	-0.002	0.399	2,000	-0.062	0.424
Δ Log(Payroll)	21,000	0.000	0.410	19,000	0.004	0.408	2,000	-0.047	0.431
Symmetric Employment	21,000	0.018	0.308	19,000	0.018	0.306	2,000	0.029	0.334
Δ Employees/ Assets	21,000	9.453	47.376	19,000	9.322	48.448	2,000	11.392	26.895
Δ Payroll/ Assets	21,000	0.349	2.697	19,000	0.347	2.776	2,000	0.388	0.966
Establishment Closure	21,000	0.472	0.499	19,000	0.471	0.499	2,000	0.486	0.500
Covenant Violation	21,000	0.063	0.244	19,000	0	0	2,000	1	0
Operating Cash Flow	21,000	0.075	0.246	19,000	0.077	0.250	2,000	0.050	0.174
Leverage	21,000	0.256	0.456	19,000	0.252	0.466	2,000	0.315	0.280
Interest Expense	21,000	0.023	0.074	19,000	0.023	0.076	2,000	0.028	0.035
Net Worth	21,000	0.432	0.967	19,000	0.435	0.995	2,000	0.393	0.371
Current Ratio	21,000	2.772	4.615	19,000	2.821	4.744	2,000	2.048	1.724
Market-to-Book	21,000	2.029	3.170	19,000	2.063	3.255	2,000	1.533	1.305
Panel B: Establishment-level (LBD)									
Δ Log(Employment)	2,000,000	-0.138	0.664	1,900,000	-0.133	0.655	100,000	-0.251	0.832
Establishment Closure	2,000,000	0.054	0.227	1,900,000	0.053	0.224	100,000	0.087	0.282
Covenant Violation	2,000,000	0.041	0.197	1,900,000	0	0	100,000	1	0
Age	2,000,000	13.021	8.811	1,900,000	13.065	8.819	100,000	11.973	8.552
Est. per Firm	21,000	93.710	356.328	20,000	93.872	357	1,000	90	347
Est. per Segment	93,000	22.003	154.284	90,000	21.913	154	3,000	24.377	162
Core	2,000,000	0.764	0.424	1,900,000	0.761	0.427	100,000	0.841	0.365
Labor Productivity	2,000,000	0.051	6.968	1,900,000	0.052	7.114	100,000	0.029	0.050
Panel C: Establishment-level (CMF/ASM)									
Δ Log(Employment)	50,000	-0.193	0.814	48,000	-0.186	0.795	2,000	-0.378	1.158
Δ Investment Rate	50,000	-0.008	0.158	48,000	-0.007	0.157	2,000	-0.025	0.161
Establishment Closure	50,000	0.035	0.185	48,000	0.034	0.18	2,000	0.077	0.267
Covenant Violation	50,000	0.040	0.197	48,000	0	0	2,000	1	0
Age	50,000	20.973	9.127	48,000	21.034	9.122	2,000	19.527	9.116
Est. per Firm	8,000	7.427	14.091	7,000	7.654	14.412	1,000	4.337	8
Est. per Segment	21,000	2.959	4.675	20,000	2.985	4.700	1,000	2.436	4.105
Core	50,000	0.653	0.476	48,000	0.647	0.478	2,000	0.808	0.411
Total Factor Productivity	50,000	1.823	0.658	48,000	1.826	0.66	2,000	1.765	0.609
Labor Prod(Alt. 1)	50,000	114.415	288.128	48,000	116.309	293.188	2,000	69.333	104.312
Labor Prod(Alt. 2)	50,000	233.327	919.057	48,000	235.547	924.285	2,000	180.473	782.704
Labor Prod(Alt. 3)	50,000	0.019	0.031	48,000	0.020	0.032	2,000	0.018	0.016
Return on Capital	50,000	5.920	604.419	48,000	6.110	617.968	2,000	1.714	4.135
Operating Risk	50,000	2.428	15.417	48,000	2.422	15.612	2,000	2.569	9.349
Operating Risk(Alt. 1)	50,000	15.161	67.914	48,000	15.372	68.896	2,000	10.141	40.702
Operating Risk(Alt. 2)	50,000	0.014	0.012	48,000	0.014	0.012	2,000	0.016	0.013
Operating Risk(Alt. 3)	50,000	0.017	0.011	48,000	0.017	0.011	2,000	0.018	0.012
Operating Risk(Alt. 4)	50,000	0.016	0.011	48,000	0.016	0.011	2,000	0.017	0.014
Operating Risk(Alt. 5)	50,000	25.904	169.89	48,000	26.180	171.685	2,000	19.801	134.152

Table 3.2 Covenant violations and resource allocation: Firm-level analysis

This table shows estimates of the firm-level impact of debt covenant violations on asset allocation. The unit of observation in each regression is a firm-year pair. The dependent variable is the annual change in the natural logarithm of the number of employees aggregated across establishments (columns [1] to [4]) and an indicator for whether the firm closed any establishment in a year (column [5]). A covenant violation occurs when a firm reports a covenant violation in a SEC 10-K or 10-Q filing in the current but not previous year. Covenant controls include operating cash flow scaled by average assets, leverage, interest expense, net worth, current ratio, and market-to-book ratio. Higher-order and lagged covenant controls refer to the second and third power and one-year lag of the covenant controls, respectively. All variables are defined in Appendix A. Industry fixed effects are based on three-digit SIC codes. Standard errors (in parentheses) are clustered at the firm level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent variable:	Δ*Log(Employment)*				*Est. Closure*
	[1]	[2]	[3]	[4]	[5]
Covenant Violation	-0.063***	-0.042***	-0.042***	-0.040***	0.024**
	(0.007)	(0.008)	(0.009)	(0.009)	(0.012)
Operating Cash Flow		0.013***	0.061**	0.119***	0.143***
		(0.013)	(0.028)	(0.036)	(0.036)
Leverage		0.048**	-0.063*	-0.095	-0.157
		(0.020)	(0.032)	(0.078)	(0.126)
Interest Expense		-0.085	-0.372	0.332	4.033***
		(0.182)	(0.257)	(0.848)	(1.268)
Net Worth		0.073***	0.032	0.050	0.007
		(0.014)	(0.026)	(0.032)	(0.043)
Current Ratio		0.001	-0.007***	0.000	-0.016
		(0.001)	(0.002)	(0.006)	(0.011)
Market-to-Book		0.019***	0.022***	0.061***	-0.038**
		(0.001)	(0.002)	(0.010)	(0.016)
Lagged covenant controls	N	N	Y	Y	Y
Higher-order covenant controls	N	N	N	Y	Y
Industry fixed effects	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y
Rounded N	30,000	26,000	21,000	21,000	21,000
R^2	0.02	0.12	0.11	0.11	0.32

Table 3.3 Resource allocation and establishment industry focus

This table presents estimates of the within-firm impact of debt covenant violations on resource allocation among establishments within the core and peripheral industry focus of the firm. The unit of observation in each regression is an establishment-year pair. Core (peripheral) establishments are establishments operating in three-digit SIC industries that account for more than (less than) 25% of the firm's total employment expenditures. The dependent variables in columns [1] to [4] and [5] are the annual change in the (log) number of employees and a dummy variable indicating whether an establishment is closed or not, respectively. A covenant violation occurs when a firms reports a covenant violation in a SEC 10-K or 10-Q filing in the current but not previous year. Establishment controls include age, the number of establishments, and the number of establishments per segment. Industry fixed effects are based on establishments' three-digit SIC codes. All variables are defined in Appendix A. Standard errors (in parentheses) are clustered at the firm level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent variable:	Δ*Log(Employment)*				*Est. Closure*
	[1]	[2]	[3]	[4]	[5]
Covenant Violation × *Core*	-0.027*	-0.026*	-0.048***	-0.049***	0.013***
	(0.015)	(0.016)	(0.018)	(0.019)	(0.001)
Covenant Violation × *Peripheral*	-0.084***	-0.090***	-0.103***	-0.097***	0.039***
	(0.036)	(0.035)	(0.040)	(0.038)	(0.002)
Establishment controls	Y	Y	Y	Y	Y
Covenant controls	N	Y	Y	Y	Y
Lagged covenant controls	N	N	Y	Y	Y
Higher-order covenant controls	N	N	N	Y	Y
Firm fixed effects	Y	Y	Y	Y	Y
Industry × state × year fixed effects	Y	Y	Y	Y	Y
Rounded N	3,000,000	2,500,000	2,000,000	2,000,000	2,000,000
R^2	0.13	0.14	0.15	0.15	0.14

Table 3.4 Robustness checks for the analysis of establishment industry focus

This table presents robustness checks for the estimates of the within-firm impact of debt covenant violations on resource allocation among establishments based on alternative classifications of establishments' industry focus. The unit of observation in each regression is an establishment-year pair. Columns [1] and [2] define peripheral establishments as establishments operating in four-digit SIC industries accounting for less than 25% of the firm's total employment expenditures. In columns [3] and [4], they are establishments operating in three-digit SIC industries that account for less than 50% of these expenditures. The dependent variables in columns [1] and [3], and [2] and [4] are annual change in the (log) number of employees, and a dummy variable indicating whether the establishment is closed, respectively. A covenant violation occurs when a firm reports a covenant violation in a SEC 10-K or 10-Q filing in the current but not previous year. Establishment controls include age, the number of establishments, and the number of establishments per segment. Industry fixed effects are based on establishments' three-digit SIC codes. All variables are defined in Appendix A. Standard errors (in parentheses) are clustered at the firm level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Alternative measurement:	Four-digit SIC		50% cutoff	
Dependent variable:	Δ*Log(Emp.)*	*Est. Closure*	Δ*Log(Emp.)*	*Est. Closure*
	[1]	[2]	[3]	[4]
Covenant Violation × *Core*	-0.048***	0.013***	-0.050***	0.012***
	(0.018)	(0.001)	(0.019)	(0.001)
Covenant Violation × *Peripheral*	-0.094***	0.036***	-0.085***	0.031***
	(0.034)	(0.002)	(0.033)	(0.001)
Establishment controls	Y	Y	Y	Y
Covenant controls	Y	Y	Y	Y
Lagged covenant controls	Y	Y	Y	Y
Higher-order covenant controls	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y
Industry × state × year fixed effects	Y	Y	Y	Y
Rounded N	2,000,000	2,000,000	2,000,000	2,000,000
R^2	0.15	0.14	0.15	0.14

Table 3.5 Resource allocation and establishment productivity

This table presents estimates of the within-firm impact of debt covenant violations on resource allocation among productive and unproductive manufacturing establishments. The unit of observation in each regression is an establishment-year pair. The dependent variable in columns [1] to [8] is the annual change in the (log) number of employees and in column [9] a dummy variable indicating whether the establishment is closed. In columns [1] to [4] and [9] each establishment is classified as productive or unproductive depending on its within-firm total factor productivity (TFP) ranking. An establishment is considered productive (unproductive) if its corresponding TFP rank is above (below) the median TFP of the establishments belonging to the firm in a given year. Column [5] uses the within-industry total factor productivity to rank establishments. Columns [6] to [8] use three measures of labor productivity: value-added per labor hour, output divided by total labor hours, and wage per hour. A covenant violation occurs when a firm reports a covenant violation in a SEC 10-K or 10-Q filing in the current but not previous year. Establishment controls include age, the number of establishments, and the number of establishments per segment. Industry fixed effects are based on establishments' three-digit SIC codes. All variables are defined in Appendix A. Standard errors (in parentheses) are clustered at the firm level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent variable:	$\Delta Log(Employment)$								*Est. Closure*
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Covenant Violation × *Productive*	-0.057*	-0.051	-0.045	-0.040	-0.013	-0.018	-0.029	0.035	0.008
	(0.031)	(0.033)	(0.037)	(0.039)	(0.041)	(0.040)	(0.040)	(0.045)	(0.008)
Covenant Violation × *Unproductive*	-0.190***	-0.188***	-0.142***	-0.135***	-0.143***	-0.134***	-0.128***	-0.181***	0.026***
	(0.037)	(0.041)	(0.046)	(0.048)	(0.045)	(0.044)	(0.045)	(0.050)	(0.008)
Establishment controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
Covenant controls	N	Y	Y	Y	Y	Y	Y	Y	Y
Lagged covenant controls	N	N	Y	Y	Y	Y	Y	Y	Y
Higher-order covenant controls	N	N	N	Y	Y	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
Industry × state × year fixed effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
Rounded N	80,000	65,000	50,000	50,000	50,000	50,000	50,000	50,000	60,000
R^2	0.30	0.32	0.34	0.34	0.34	0.34	0.34	0.34	0.32

Table 3.6 Establishment productivity and investment

This table presents estimates of the within-firm impact of debt covenant violations on resource allocation among productive and unproductive manufacturing establishments. The unit of observation in each regression is an establishment-year pair. The dependent variable the annual change in investment given by establishment-level capital expenditures over capital stock. In columns [1] to [4] each establishment is classified as productive or unproductive depending on its within-firm total factor productivity (TFP) ranking. An establishment is considered productive (unproductive) if its corresponding TFP rank is above (below) the median TFP of the establishments belonging to the firm in a given year. Column [5] uses the within-industry total factor productivity to rank establishments. Column [6] uses return on capital to measure capital productivity. A covenant violation occurs when a firm reports a covenant violation in a SEC 10-K or 10-Q filing in the current but not previous year. Establishment controls include age, the number of establishments, and the number of establishments per segment. Industry fixed effects are based on establishments' three-digit SIC codes. All variables are defined in Appendix A. Standard errors (in parentheses) are clustered at the firm level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent variable: Δ*Investment Rate*						
	[1]	[2]	[3]	[4]	[5]	[6]
Covenant Violation × *Productive*	-0.004	0.006	0.006	0.004	0.007	-0.002
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Covenant Violation × *Unproductive*	-0.027***	-0.020***	-0.022***	-0.024***	-0.022***	-0.015**
	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)	(0.007)
Establishment controls	Y	Y	Y	Y	Y	Y
Covenant controls	N	Y	Y	Y	Y	Y
Lagged covenant controls	N	N	Y	Y	Y	Y
Higher-order covenant controls	N	N	N	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y	Y	Y
Industry × state × year fixed effects	Y	Y	Y	Y	Y	Y
Rounded N	70,000	60,000	50,000	50,000	50,000	50,000
R^2	0.25	0.26	0.26	0.26	0.26	0.26

Table 3.7 Interaction between establishment industry focus and productivity

This table presents estimates of how the within-firm impact of debt covenant violations on resource allocation among establishments within the core and peripheral industry focus of the firm interacts with establishment productivity. The sample is restricted to manufacturing firms. The unit of observation in each regression is an establishment-year pair. Core (peripheral) establishments are establishments operating in three-digit SIC industries that account for more than (less than) 25% of the firm's total employment expenditures. The dependent variables in columns [1] to [3] and [4] to [6] are the annual change in the (log) number of employees and a dummy variable indicating whether an establishment is closed or not, respectively. In columns [2] and [5] ([3] and [6]) each establishment is classified as productive or unproductive depending on its within-firm (within-three-digit SIC industry) total factor productivity (TFP) ranking. An establishment is considered productive if its corresponding TFP rank is above the median TFP of the establishments belonging to the firm (industry) in a given year, and unproductive otherwise. A covenant violation occurs when a firms reports a covenant violation in a SEC 10-K or 10-Q filing in the current but not previous year. Establishment controls include age, the number of establishments, and the number of establishments per segment. Industry fixed effects are based on establishments' three-digit SIC codes. All variables are defined in Appendix A. Standard errors (in parentheses) are clustered at the firm level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent variable:	*ΔLog(Employment)*			*Establishment Closure*		
	[1]	[2]	[3]	[4]	[5]	[6]
Covenant Violation × Core	-0.065**			0.015***		
	(0.031)			(0.006)		
Covenant Violation × Peripheral	-0.136***			0.027**		
	(0.040)			(0.011)		
Covenant Violation × Core × Productive		-0.028	-0.003		0.010	0.006
		(0.033)	(0.031)		(0.007)	(0.009)
Covenant Violation × Core × Unproductive		-0.108**	-0.119**		0.022**	0.022***
		(0.044)	(0.053)		(0.009)	(0.008)
Covenant Violation × Peripheral × Productive		-0.069	-0.045		0.023	0.014
		(0.066)	(0.054)		(0.018)	(0.018)
Covenant Violation × Peripheral × Unproductive		-0.225***	-0.215**		0.035**	0.038**
		(0.077)	(0.097)		(0.018)	(0.018)
Establishment controls	Y	Y	Y	Y	Y	Y
Covenant controls	Y	Y	Y	Y	Y	Y
Lagged covenant controls	Y	Y	Y	Y	Y	Y
Higher-order covenant controls	Y	Y	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y	Y	Y
Industry × state × year fixed effects	Y	Y	Y	Y	Y	Y
Rounded N	50,000	50,000	50,000	60,000	60,000	60,000
R^2	0.34	0.34	0.34	0.32	0.32	0.32

Table 3.8 Importance of establishment operating risk for resource allocation

This table presents estimates of the impact of debt covenant violations on within-firm resource allocation as a function of the operating risk. The sample is restricted to manufacturing firms. The unit of observation in each regression is an establishment-year pair. In panel A the dependent variable is the annual change in the (log) number of employees and in panel B it is a dummy variable indicating whether the establishment is closed. In columns [1] to [4] each establishment is classified as safe or risky depending on the cross-sectional standard deviation of operating margins across Census establishments in the same three-digit SIC code. Operating margins are calculated as the total value of shipments minus all input costs divided by the value of shipments made by the establishment. An establishment is considered safe (risky) if its corresponding industry standard deviation of operating margins is below (above) the median of all industries in a given year. Column [5] classifies establishments as safe or risky instead based on the cross-sectional standard deviation of operating margins across Compustat firms at the three-digit SIC code level. Column [6] ([7]) uses the time-series standard deviation of the average industry operating margin at the three-digit SIC level based on Compustat firms using 5 (10) years of data. Column [8] uses the time-series standard deviation of the average industry ratio of operating cash flows to assets at the three-digit SIC level based on Compustat firms using 5 years of data. A covenant violation occurs when a firm reports a covenant violation in a SEC 10-K or 10-Q filing in the current but not previous year. Establishment controls include age, the number of establishments, and the number of establishments per segment. Industry fixed effects are based on establishments' three-digit SIC codes. All variables are defined in Appendix A. Standard errors (in parentheses) are clustered at the firm level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Employment								
Dependent Variable: Δ*Log(Employment)*								
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Covenant Violation × *Safe*	-0.010	-0.005	-0.012	-0.004	-0.043	-0.030	-0.031	-0.053
	(0.044)	(0.044)	(0.049)	(0.051)	(0.045)	(0.040)	(0.042)	(0.037)
Covenant Violation × *Risky*	-0.154***	-0.149***	-0.119***	-0.113***	-0.107***	-0.157***	-0.152***	-0.155***
	(0.033)	(0.037)	(0.034)	(0.036)	(0.038)	(0.052)	(0.046)	(0.057)
Establishment controls	Y	Y	Y	Y	Y	Y	Y	Y
Covenant controls	N	Y	Y	Y	Y	Y	Y	Y
Lagged covenant controls	N	N	Y	Y	Y	Y	Y	Y
Higher-order covenant controls	N	N	N	Y	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Industry × state × year fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Rounded N	80,000	65,000	50,000	50,000	50,000	50,000	50,000	50,000
R^2	0.30	0.32	0.34	0.34	0.34	0.34	0.34	0.34

Table 3.8 (con't.)

Panel B: Establisment closure								
Dependent variable: *Establishment Closure*								
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Covenant Violation × *Safe*	0.006	0.003	0.003	0.002	0.006	0.014*	0.013*	0.015**
	(0.008)	(0.009)	(0.009)	(0.009)	(0.009)	(0.007)	(0.007)	(0.006)
Covenant Violation × *Risky*	0.031***	0.028***	0.025***	0.024***	0.026***	0.024***	0.026***	0.025***
	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)	(0.009)
Establishment controls	Y	Y	Y	Y	Y	Y	Y	Y
Covenant controls	N	Y	Y	Y	Y	Y	Y	Y
Lagged covenant controls	N	N	Y	Y	Y	Y	Y	Y
Higher-order covenant controls	N	N	N	Y	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Industry × state × year fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Rounded N	100,000	80,000	60,000	60,000	60,000	60,000	60,000	60,000
R^2	0.27	0.29	0.32	0.32	0.32	0.32	0.32	0.32

Table 3.9 Interaction between establishment productivity and operating risk

This table presents estimates of how the within-firm impact of debt covenant violations on resource allocation among establishments with varying productivity interacts with operating risk. The sample is restricted to manufacturing firms. The unit of observation in each regression is an establishment-year pair. In panel A the dependent variable is the annual change in the (log) number of employees and in panel B it is a dummy variable indicating whether the establishment is closed. In columns [1] to [5] ([6]) each establishment is classified as productive or unproductive depending on its within-firm (within-three-digit SIC industry) total factor productivity (TFP) ranking. An establishment is considered productive if its corresponding TFP rank is above the median TFP of the establishments belonging to the firm (industry) in a given year, and unproductive otherwise. In column [1] each establishment is classified as safe or risky depending on the cross-sectional standard deviation of operating margins across Census establishments in the same three-digit SIC code. Operating margins are calculated as the total value of shipments minus all input costs divided by the value of shipments made by the establishment. An establishment is considered safe (risky) if its corresponding industry standard deviation of operating margins is below (above) the median of all industries in a given year. Column [2] classifies establishments as safe or risky instead based on the cross-sectional standard deviation of operating margins across Compustat firms at the three-digit SIC code level. Column [3] ([4]) uses the time-series standard deviation of the average industry operating margin at the three-digit SIC level based on Compustat firms using 5 (10) years of data. Column [5] uses the time-series standard deviation of the average industry ratio of operating cash flows to assets at the three-digit SIC level based on Compustat firms using 5 years of data. A covenant violation occurs when a firm reports a covenant violation in a SEC 10-K or 10-Q filing in the current but not previous year. Establishment controls include age, the number of establishments, and the number of establishments per segment. Industry fixed effects are based on establishments' three-digit SIC codes. All variables are defined in Appendix A. Standard errors (in parentheses) are clustered at the firm level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Employment						
Dependent variable: Δ*Log(Employment)*						
	[1]	[2]	[3]	[4]	[5]	[6]
Covenant Violation × *Productive* × *Safe*	0.071	0.011	-0.002	-0.008	-0.016	0.019
	(0.068)	(0.052)	(0.048)	(0.044)	(0.045)	(0.076)
Covenant Violation × *Productive* × *Risky*	-0.080	-0.067	-0.095	-0.082	-0.099	-0.025
	(0.051)	(0.054)	(0.061)	(0.056)	(0.063)	(0.049)
Covenant Violation × *Unproductive* × *Safe*	-0.086	-0.105	-0.065	-0.061	-0.099*	-0.027
	(0.086)	(0.071)	(0.055)	(0.055)	(0.055)	(0.096)
Covenant Violation × *Unproductive* × *Risky*	-0.162***	-0.166***	-0.234***	-0.237***	-0.220***	-0.185***
	(0.063)	(0.059)	(0.077)	(0.070)	(0.083)	(0.055)
Establishment controls	Y	Y	Y	Y	Y	Y
Covenant controls	Y	Y	Y	Y	Y	Y
Lagged covenant controls	Y	Y	Y	Y	Y	Y
Higher-order covenant controls	Y	Y	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y	Y	Y
Industry × state × year fixed effects	Y	Y	Y	Y	Y	Y
Rounded N	50,000	50,000	50,000	50,000	50,000	50,000
R^2	0.34	0.34	0.34	0.34	0.34	0.34

Table 3.9 (con't.)

Panel B: Establishment closure						
Dependent variable: *Establishment Closure*						
	[1]	[2]	[3]	[4]	[5]	[6]
Covenant Violation × *Productive* × *Safe*	-0.012	-0.002	0.010	0.010	0.009	-0.003
	(0.013)	(0.011)	(0.009)	(0.009)	(0.008)	(0.015)
Covenant Violation × *Productive* × *Risky*	0.022**	0.021**	0.017	0.016	0.020*	0.013
	(0.009)	(0.009)	(0.011)	(0.011)	(0.012)	(0.010)
Covenant Violation × *Unproductive* × *Safe*	0.018	0.014	0.020*	0.015	0.022**	0.007
	(0.017)	(0.012)	(0.011)	(0.010)	(0.010)	(0.016)
Covenant Violation × *Unproductive* × *Risky*	0.026***	0.031***	0.030**	0.037***	0.030**	0.033***
	(0.010)	(0.011)	(0.013)	(0.012)	(0.015)	(0.010)
Establishment controls	Y	Y	Y	Y	Y	Y
Covenant controls	Y	Y	Y	Y	Y	Y
Lagged covenant controls	Y	Y	Y	Y	Y	Y
Higher-order covenant controls	Y	Y	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y	Y	Y
Industry × state × year fixed effects	Y	Y	Y	Y	Y	Y
Rounded N	60,000	60,000	60,000	60,000	60,000	60,000
R^2	0.32	0.32	0.32	0.32	0.32	0.32

Table 3.10 Cross-sectional heterogeneity: Borrower characteristics

This table presents estimates of how the within-firm impact of debt covenant violations on resource allocation among establishments with varying borrower and industry characteristics. The sample is restricted to manufacturing firms. The unit of observation in each regression is an establishment-year pair. Panel A and B examine borrowers' industry competition and credit rating status, respectively. In columns [1] to [3] and [4] to [6] the dependent variables are the annual change in the (log) number of employees and a dummy variable indicating whether the establishment is closed, respectively. Core (peripheral) establishments are establishments operating in three-digit SIC industries that account for more than (less than) 25% of the firm's total employment expenditures. An establishment is considered productive if its within-firm total factor productivity (TFP) rank is above the median TFP of the establishments belonging to the firm in a given year, and unproductive otherwise. An establishment is considered safe (risky) if its industry standard deviation of operating margins is below (above) the median of all industries in a given year. An establishment operates in an uncompetitive industry if its industry Herfindahl-Hirschman Index (HHI) is above-median. A borrower is unrated if it does not have an S&P Long-Term Domestic Issuer Credit Rating. A covenant violation occurs when a firm reports a covenant violation in a SEC 10-K or 10-Q filing in the current but not previous year. Establishment controls include age, the number of establishments, and the number of establishments per segment. Industry fixed effects are based on establishments' three-digit SIC codes. All variables are defined in Appendix A. Standard errors (in parentheses) are clustered at the firm level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Borrower industry competition						
Dependent variable:	*ΔLog(Employment)*			*Establishment Closure*		
	[1]	[2]	[3]	[4]	[5]	[6]
Covenant Violation × Core	-0.048			0.012		
	(0.040)			(0.008)		
Covenant Violation × Core × Uncompetitive	-0.109*			0.011		
	(0.060)			(0.013)		
Covenant Violation × Peripheral	-0.022			0.023		
	(0.075)			(0.016)		
Covenant Violation × Peripheral × Uncompetitive	-0.310***			0.059**		
	(0.131)			(0.024)		
Covenant Violation × Productive		0.005			0.012	
		(0.051)			(0.010)	
Covenant Violation × Productive × Uncompetitive		-0.055			0.001	
		(0.076)			(0.016)	
Covenant Violation × Unproductive		-0.085*			0.017*	
		(0.050)			(0.009)	
Covenant Violation × Unproductive × Uncompetitive		-0.263***			0.042***	
		(0.077)			(0.014)	
Covenant Violation × Safe			-0.038			0.015
			(0.050)			(0.011)
Covenant Violation × Safe × Uncompetitive			-0.057			-0.013
			(0.078)			(0.014)
Covenant Violation × Risky			-0.046			0.015*
			(0.050)			(0.008)
Covenant Violation × Risky × Uncompetitive			-0.247***			0.050***
			(0.087)			(0.016)
Establishment controls	Y	Y	Y	Y	Y	Y
Covenant controls	Y	Y	Y	Y	Y	Y
Lagged covenant controls	Y	Y	Y	Y	Y	Y
Higher-order covenant controls	Y	Y	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y	Y	Y
Industry × state × year fixed effects	Y	Y	Y	Y	Y	Y
Rounded N	50,000	50,000	50,000	60,000	60,000	60,000
R^2	0.34	0.34	0.34	0.29	0.32	0.32

Table 3.10 (con't.)

Panel B: Borrower credit rating status						
Dependent variable:	Δ *Log(Employment)*			*Establishment Closure*		
	[1]	[2]	[3]	[4]	[5]	[6]
Covenant Violation × *Core*	-0.052			0.011		
	(0.049)			(0.009)		
Covenant Violation × *Core* × *Unrated*	-0.051			0.010		
	(0.039)			(0.008)		
Covenant Violation × *Peripheral*	-0.074			0.024		
	(0.119)			(0.026)		
Covenant Violation × *Peripheral* × *Unrated*	-0.217**			0.048***		
	(0.091)			(0.016)		
Covenant Violation × *Productive*		-0.047			0.004	
		(0.072)			(0.015)	
Covenant Violation × *Productive* × *Unrated*		-0.005			0.005	
		(0.062)			(0.010)	
Covenant Violation × *Unproductive*		-0.062			0.018	
		(0.097)			(0.012)	
Covenant Violation × *Unproductive* × *Unrated*		-0.199***			0.033***	
		(0.071)			(0.011)	
Covenant Violation × *Safe*			-0.029			0.011
			(0.067)			(0.026)
Covenant Violation × *Safe* × *Unrated*			0.002			0.000
			(0.037)			(0.011)
Covenant Violation × *Risky*			-0.064			0.014
			(0.046)			(0.009)
Covenant Violation × *Risky* × *Unrated*			-0.156***			0.032***
			(0.050)			(0.012)
Establishment controls	Y	Y	Y	Y	Y	Y
Covenant controls	Y	Y	Y	Y	Y	Y
Lagged covenant controls	Y	Y	Y	Y	Y	Y
Higher-order covenant controls	Y	Y	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y	Y	Y
Industry × state × year fixed effects	Y	Y	Y	Y	Y	Y
Rounded N	50,000	50,000	50,000	60,000	60,000	60,000
R^2	0.32	0.33	0.32	0.29	0.29	0.29

Table 3.11 Cross-sectional heterogeneity: Role of lender industry experience

This table presents estimates of how the within-firm impact of debt covenant violations on resource allocation among establishments with varying lead lender experience. The sample is restricted to manufacturing firms. The unit of observation in each regression is an establishment-year pair. Panel A and B examine lenders' industry experience defined according to whether the borrower's lead lender lends to other firms in the same industry or if they have a significant (above-median) market share of lending to the borrower's industry or not, respectively. If a borrower has multiple lead lenders then the lead bank arranging the most amount of credit in dollar terms is selected. In columns [1] to [3] and [4] to [6] the dependent variables are the annual change in the (log) number of employees and a dummy variable indicating whether the establishment is closed, respectively. Core (peripheral) establishments are establishments operating in three-digit SIC industries that account for more than (less than) 25% of the firm's total employment expenditures. An establishment is considered productive if its within-firm total factor productivity (TFP) rank is above the median TFP of the establishments belonging to the firm in a given year, and unproductive otherwise. An establishment is considered safe (risky) if its industry standard deviation of operating margins is below (above) the median of all industries in a given year. A covenant violation occurs when a firm reports a covenant violation in a SEC 10-K or 10-Q filing in the current but not previous year. Establishment controls include age, the number of establishments, and the number of establishments per segment. Industry fixed effects are based on establishments' three-digit SIC codes. All variables are defined in Appendix A. Standard errors (in parentheses) are clustered at the firm level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Lead arranger industry experience						
Dependent variable:	*ΔLog(Employment)*			*Establishment Closure*		
	[1]	[2]	[3]	[4]	[5]	[6]
Covenant Violation × Core	-0.010			-0.009		
	(0.076)			(0.020)		
Covenant Violation × Core × Industry Experience	-0.073*			0.009		
	(0.044)			(0.010)		
Covenant Violation × Peripheral	0.016			-0.005		
	(0.083)			(0.028)		
Covenant Violation × Peripheral × Industry Experience	-0.157***			0.038***		
	(0.037)			(0.012)		
Covenant Violation × Productive		0.059			-0.024	
		(0.118)			(0.027)	
Covenant Violation × Productive × Industry Experience		-0.066			0.009	
		(0.048)			(0.011)	
Covenant Violation × Unproductive		-0.054			0.003	
		(0.059)			(0.016)	
Covenant Violation × Unproductive × Industry Experience		-0.158**			0.030***	
		(0.045)			(0.011)	
Covenant Violation × Safe			-0.017			-0.014
			(0.077)			(0.015)
Covenant Violation × Safe × Industry Experience			-0.035			0.004
			(0.049)			(0.011)
Covenant Violation × Risky			0.019			-0.004
			(0.096)			(0.025)
Covenant Violation × Risky × Industry Experience			-0.152***			0.032***
			(0.050)			(0.011)
Establishment controls	Y	Y	Y	Y	Y	Y
Covenant controls	Y	Y	Y	Y	Y	Y
Lagged covenant controls	Y	Y	Y	Y	Y	Y
Higher-order covenant controls	Y	Y	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y	Y	Y
Industry × state × year fixed effects	Y	Y	Y	Y	Y	Y
Rounded N	40,000	40,000	40,000	40,000	40,000	40,000
R^2	0.33	0.35	0.35	0.31	0.31	0.34

Table 3.11 (con't.)

Panel B: Lead arranger market share						
Dependent variable:	*Δ Log(Employment)*			*Establishment Closure*		
	[1]	[2]	[3]	[4]	[5]	[6]
Covenant Violation × *Core*	0.021			-0.006		
	(0.114)			(0.023)		
Covenant Violation × *Core* × *High Share*	-0.069			0.011		
	(0.043)			(0.009)		
Covenant Violation × *Peripheral*	-0.009			-0.017		
	(0.137)			(0.028)		
Covenant Violation × *Peripheral* × *High Share*	-0.140***			0.031***		
	(0.049)			(0.009)		
Covenant Violation × *Productive*		-0.000			0.002	
		(0.118)			(0.032)	
Covenant Violation × *Productive* × *High Share*		-0.057			0.013	
		(0.042)			(0.009)	
Covenant Violation × *Unproductive*		0.043			-0.022	
		(0.100)			(0.026)	
Covenant Violation × *Unproductive* × *High Share*		-0.157***			0.026***	
		(0.042)			(0.009)	
Covenant Violation × *Safe*			0.026			0.041
			(0.125)			(0.032)
Covenant Violation × *Safe* × *High Share*			-0.038			0.004
			(0.043)			(0.010)
Covenant Violation × *Risky*			0.012			0.005
			(0.110)			(0.029)
Covenant Violation × *Risky* × *High Share*			-0.141***			0.028***
			(0.047)			(0.010)
Establishment controls	Y	Y	Y	Y	Y	Y
Covenant controls	Y	Y	Y	Y	Y	Y
Lagged covenant controls	Y	Y	Y	Y	Y	Y
Higher-order covenant controls	Y	Y	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y	Y	Y
Industry × state × year fixed effects	Y	Y	Y	Y	Y	Y
Rounded N	40,000	40,000	40,000	40,000	40,000	40,000
R^2	0.33	0.35	0.35	0.34	0.31	0.34

APPENDIX A

VARIABLE DEFINITIONS

A.1. Variable Definitions for Chapter 2

ARL: Indicator variable if firm is headquartered in a treated state between 1997 and 2001 or incorporated in a treated state between 1997 and 2003
Total Factor Productivity: Establishment-level log total factor productivity computed following Foster et al. (2014)
Labor Productivity: Sales minus material and energy costs divided by plant-level total hours
Return on Capital: Sales minus material and energy costs and payroll divided by plant-level capital stock
Capital Stock: Sum of structures and equipment calculated using perpetual inventory method
Size: Natural logarithm of the plant's value of shipments
Age: Number of years since the first year the plant first appears in the LBD
Number of Plants: The total number of plants of the parent firm
New Machinery Investment: New machinery expenditures divided by plant-level capital stock
Computer Investment: Capital expenditures for computers divided by plant-level capital stock
Total Payroll: Total amount of wages and salaries paid
Production Workers' Payroll: Total amount of wages and salaries paid to production workers
Employees: Number of employees working in the plant
Total Hours: Total production worker hours times total wage bills divided by wage bills for production workers
Sales: Natural logarithm of sales (*sale*)
Profitability: Operating income before depreciation (*oibdp*) minus depreciation and amortization (*dp*) divided by total assets (*at*)
Tobin's Q: Number of common stocks (*csho*) times end of year closing price (*prcc*) plus total assets (*at*) minus common equity (*ceq*) minus deferred taxes (*txdb*) divided by total assets

(at)

Tangibility: Property, plant, and equipment ($ppent$) divided by total assets (at) t

A.2. Variable Definitions for Chapter 3

Δ*Log(Employment)*: Annual change in the natural logarithm of number of employees summed across establishments

Δ*Log(Payroll)*: Annual change in the natural logarithm of payroll summed across establishments

Symmetric Employment Growth: Twice the annual change in total employees over the sum of current and lagged employment

Δ*Employees/Average Assets*: Annual change in the number of employees divided by the average of current and lagged book assets

Δ*Payroll/Average Assets*: Annual change in payroll divided by the average of current and lagged book assets

Establishment Closure: Indicator variable equal to one if the firm closes any establishment in the current year

Covenant Violation: Indicator variable equal to one if the firm violates a covenant in the current but not previous year

New Capital Expenditure Restriction: Indicator variable equal to one if the new contract contains a capital expenditure restriction and the previous contract for the same borrower does not

Old Capital Expenditure Restriction: Indicator variable equal to one if the new contract contains a capital expenditure restriction

Operating Cash Flow: Operating income before depreciation divided by average assets

Leverage: Sum of debt in current liabilities and long-term debt divided by total assets

Interest Expense: Interest expense divided by average assets

Net Worth: Stockholders equity divided by total assets

Current Ratio: Current assets divided by current liabilities

Market-to-Book: Market value of equity minus book equity (adjusted for deferred taxes) divided by total asets

Δ*Log(Employment)*: Annual change in the establishment-level natural logarithm of number of employees

Δ*Investment Rate*: Annual change in establishment-level capital expenditures divided by capital stock

Establishment Closure: Indicator variable equal to one if the establishment is closed

Covenant Violation: Indicator variable equal to one if the parent firm had a covenant violation in the current but not previous year

Age: Number of years since the first year the establishment first appears in the LBD

Establishments per Firm: The total number of establishments of the parent firm
Establishments per Segment: The average number of establishments per three-digit industry segment of the parent firm
Core: Establishment operates in three-digit SIC industry containing at least 25% of firm employment
Total Factor Productivity: Establishment-level log total factor productivity computed following Foster et al. (2013)
Labor Productivity: Average wage defined as payroll divided by number of employees
Labor Productivity (Alt. 1): Value-added per labor hour defined as sales minus materials and energy costs divided labor hours
Labor Productivity (Alt. 2): Output divided by total labor hours
Labor Productivity (Alt. 3): Wage per hour defined as payroll divided by total labor hours
Return on Capital: Sales minus material and energy costs and payroll divided by establishment-level capital stock
Operating Risk: Cross-sectional volatility of establishment operating margins at three-digit SIC code level
Operating Risk (Alt. 1): Cross-sectional volatility of firm operating margins at the three-digit SIC code level
Operating Risk (Alt. 2): 5-year time-series volatility of average industry operating margin at the three-digit SIC level
Operating Risk (Alt. 3): 10-year time-series volatility of average industry operating margin at the three-digit SIC level
Operating Risk (Alt. 4): 5-year time-series volatility of average industry ratio of operating cash flows to assets at the three-digit SIC level
Operating Risk (Alt. 5): Cross-sectional volatility of establishment return on capital at three-digit SIC code level

APPENDIX B

LEGAL APPENDIX

B.1. Fraudulent Transfer Law

B.1.1. Small Business Failure

Although business failure is often synonymous with bankruptcy, bankruptcy is a distinct legal process that is governed in the United States by federal code. This code is divided into several chapters that relate to different types of bankrupt entities.[1] While Chapter 7 relates to both small businesses as well as individuals wishing to liquidate substantially all of their assets, sole proprietors are often given the option to undergo either Chapter 11 or Chapter 13 proceedings if they hope to reorganize. Partnerships, LLCs, and corporations are not given the option of filing for Chapter 13. Because Chapter 11 is costlier, most sole proprietors that file for bankruptcy choose to file for Chapter 13, although eligibility is dictated by size restrictions on debt.[2]

Bankruptcy is not the only option for entrepreneurs, however. Because of filing fees, legal fees, long bankruptcy durations, loss of control over business operations, the automatic stay, and other indirect costs associated with bankruptcy, both debtors and creditors of small businesses often prefer to avoid bankruptcy if possible.[3] Morrison (2008, 2009) provides a comprehensive overview of the small business decision whether to file for bankruptcy or cease operations based on other means when faced with insolvency. Using data from 2004 until 2006, these studies show that federal bankruptcy filings were only between 3 and 4 percent of business closures that took place among indebted businesses. When limited to businesses that closed while financially distressed based on the Dun & Bradstreet financial

[1] Chapter 7 concerns asset liquidation, Chapter 9 the reorganization of municipalities, Chapter 11 complex reorganizations (generally of businesses), Chapter 12 reorganizations of family farms or fishermen, Chapter 13 reorganization for individuals, and Chapter 15 cross-border insolvency.

[2] Currently, individuals with more than $383,175 in unsecured claims and $1,149,525 in secured claims may not file for Chapter 13 bankruptcy; see `www.nolo.com/legal-encyclopedia/chapter-13-chapter-11-bankruptcy-small-business-owners.html`.

[3] Creditors may force debtors into involuntary bankruptcy, but this is not common in practice. Rather, it can be used as a bargaining chip for debtors in a private workout.

distress score, the ratio of failing firms filing for bankruptcy jumps to between 10 and 13 percent for non-corporations and between 21 and 22 percent for corporations. Even based on stringent definitions, though, the majority of insolvent businesses liquidate or reorganize without filing for federal bankruptcy.

What are the alternatives to bankruptcy? The procedures in place typically derive from the laws of contracts, trusts, and secured lending, which are enforced in state courts based on each state's judicial organizational structure. The friendliest option is a private workout that avoids courts altogether. These agreements rely on the debtor's ability to arrange for a plan of asset distribution in a way that satisfies all parties involved. Another option, at least for secured creditors, is to step in and foreclose on any assets in which they have a security interest. They may do so based on state laws set forth in the Uniform Commercial Code. If these actions are taken by secured creditors without impediments by debtors or unsecured creditors, then the process is known as a friendly foreclosure. Alternatively, if a business owner wishes to continue operations, similar to a restructuring under Chapter 11 of the Bankruptcy Code, then he has the option of undergoing a procedure called an "assignment for benefit of creditors" or ABC. In this case, a trustee receives the assets of the business and holds an auction.[4] Proceeds go toward the secured debt holders, unsecured debt holders receive nothing if the secured claimants are not made whole, and the old business ceases to exist as a legal entity. Often, though, the former business owner is able to repurchase most of the assets of the business and establish a new entity.

In any of these situations, aggrieved parties may attempt to delay proceedings or receive higher distributions by bringing suit against another party in state court. One course of action, also used frequently in bankruptcy proceedings, is referred to as an avoidance, and takes place when a previous transaction carried out by the business is undone. Transactions found to be fraudulent—the subject of this paper—are one example of commonly sought avoidances. Preferential transfers, or transfers to a junior class of claim holders or to an equivalent class of claim holders in a way that is not pro rata, are also an important feature of fraudulent transfer law.

B.1.2. Organizational Structure and Personal Wealth Protection

There are two important features that govern the interactions between a business owner and outside agents: the establishment of the business as a separate legal entity and the

[4]The details of these auctions vary by state. Trustees are not often required to go to great lengths to publicize these auctions, and the business owner may be able to reclaim the business physical assets as the sole bidder in the auction.

protection of the owner from unlimited liability. The line is generally drawn between sole proprietorships, which are not separate legal entities from the individual owner and do not protect the owner from unlimited liability, and limited liability companies (LLCs) or corporations, which stand on their own as legal entities and offer the owner limited liability protection.[5] The liability status of partnerships depends on whether the partnership is a limited liability partnership (LLP) or a limited partnership (LP), the latter of which may involve general partners who are not protected by limited liability. According to the U.S. Small Business Administration, 72.1 percent of businesses are sole proprietorships, while 18.5 percent are corporations (including S types). Furthermore, 79.9 percent of businesses do not officially retain any employees other than the owner-manager, and 52 percent are home-based.

In addition to separate legal status and limited liability protection, simplicity is a key factor in corporate organization. In order to technically register as a sole proprietorship, owners in most states only need to obtain local licenses at the time of business formation.[6] These licenses are usually easy to obtain, inexpensive, and do not require annual updates. In addition, assets of the business owner are commingled with personal assets, and so it is not necessary to keep separate records. Conversely, LLCs and corporations are more costly and complicated to establish and keep track of. Business owners must pay not only organizational formation fees, but also filing fees and annual state fees. Even though income from LLCs and S corporations may pass through to the business owners for taxation purposes, record-keeping is more complicated because these business forms have their own legal identities.

Regardless of organizational structure, there is only a fine line for most small businesses between personal assets and business assets. Even for businesses with limited liability protection, owners often utilize their own wealth as startup capital by transferring titles of assets to the business. They also facilitate external borrowing by providing personal guarantees. Owners continually have to decide whether to reinvest profits into the business or withdraw cash in the form of salary or dividend payments. Because of this, asset protection has become a key component of small business planning.

Exemption planning and strategic transfers are the two main tenets of asset protection planning. The relative importance of these strategies depends on the business's organizational form. For proprietorships, the first line of defense is to make full use of state

[5]LLCs may have an unlimited number of shareholders and can make disproportionate distributions to these investors, while S corporations are limited to 100 shareholders and distributions must be pro rata. Otherwise, these two structures are very similar.

[6]Technically, any freelance income qualifies the earner as a sole proprietor. In general, it is not necessary to take any formal action to register as a sole proprietorship. Various types of business, however, require licenses and permits.

asset exemption laws. For businesses in states with paltry exemptions, or medium-sized businesses that involve assets that are significantly greater than the exemption threshold, strategic transfers play a more important role. Personal assets that have been transferred to a limited liability structure very rarely qualify for exemptions, and so transfers play a more important role in protecting the assets of LLC or corporation owners.

Each state has its own set of rules governing exemptions that protect certain core personal assets from seizure by creditors. The homestead exemption is the most well known of these, followed by personal property exemptions.[7,8] Other exemptions include pension and retirement benefits, insurance, tools of trade, earned but unpaid wages, and public compensation benefits such as Social Security. Some states even offer wildcards for any other type of personal property not covered, usually up to a small amount.

Other than direct exemptions, the primary tool that small business owners may use to protect personal property from creditors is through strategic funding, or transfers of assets into and out of the business. For businesses that are not protected by limited liability, this may involve the transfer of assets into trusts or to other individuals. Domestic asset protection trusts (DAPTs) are a form of wealth protection that shield assets from creditors but also allow the transferor to be the beneficiary of the trust. They are legal in fourteen jurisdictions, but transfers of business assets into DAPTs have not received favorable treatment in insolvency proceedings. Offshore trusts used to be a popular form of asset protection, but have fallen out of favor more recently following several notorious cases.[9] Alternatively, an individual providing a personal guarantee for a business debt may still legally transfer his home to his spouse and shield it from creditors provided that the spouse is not liable to those creditors and the transfer does not qualify as fraudulent, as discussed in the Legal Appendix.

For LLC or corporation owners, protecting assets involves legally transferring them from the business to the individual. Cash may be withdrawn in the form of salary, dividend, and personal loan payments. Owner-managers are given the flexibility to determine their salaries, although how much they are able to pay is often governed by external factors.[10] The

[7]Personal property exemptions are often further itemized, and limits are applied to each category, ranging from motor vehicles to burial plots.

[8]Agarwal et al. (2005) finds that states with higher homestead exemptions are associated with higher bankruptcy rates, while Fan and White (2003) identify a positive but insignificant relationship between high exemption states and the likelihood that financially troubled businesses are shut down.

[9]After filing for bankruptcy in 1997, Stephen J. Lawrence, founder of a derivatives trading firm, was found in contempt of court for establishing offshore asset protection trusts and served several years in jail. In 1999, Michael and Denyse Anderson were also found in contempt of court after refusing to repatriate funds kept in an offshore trust, and each spent six months in jail.

[10]Corporations, for example, must pay an additional employment tax on salaries distributed to owners, therefore incentivizing distribution through dividends. This tax is levied on earnings of an LLC regardless

IRS limits distributions in the form of salary, however, and usually bases its assessment of reasonable compensation to owner-managers on gross receipts, comparable businesses, and payments to non-shareholder employees. Salary payments in excess of the acceptable limit are treated as dividends. Real property may also be transferred from a business entity to an individual through a quitclaim deed. Finally, owners may strategically withdraw cash from LLCs or corporations by giving preference to personal loans made to the business or external loans that have been backed by a personal guarantee.

B.2. Anti-Recharacterization Laws

B.2.1. State Laws

Texas and Louisiana

The section below is from Texas and Louisiana Uniform Commercial Code (U.C.C.).

Section 9-109. Scope

(e) The application of this chapter to the sale of accounts, chattel paper, payment intangibles, or promissory notes is not to recharacterize that sale as a transaction to secure indebtedness but to protect purchasers of those assets by providing a notice filing system. For all purposes, in the absence of fraud or intentional misrepresentation, the parties' characterization of a transaction as a sale of such assets shall be conclusive that the transaction is a sale and is not a secured transaction and that title, legal and equitable, has passed to the party characterized as the purchaser of those assets regardless of whether the secured party has any recourse against the debtor, whether the debtor is entitled to any surplus, or any other term of the parties' agreement.

Alabama

The section below are from the 2013 Code of Alabama.

Section 35-10A-1

This chapter may be referred to as the "Asset-Backed Securities Facilitation Act." It is intended by the Legislature that the term securitization transaction be construed broadly.

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of salary payments made to owners, while the income of sole proprietorships or partnerships is taxed as personal income regardless.

Section 35-10A-2

(a) Notwithstanding any other provision of law including, but not limited to, Section 7-9-506 and Section 7-9A-623, to the extent set forth in the transaction documents relating to a securitization transaction:

(1) Any property, assets, or rights purported to be transferred, in whole or in part, in the securitization transaction shall be deemed to no longer be the property, assets, or rights of the transferor;

(2) A transferor in the securitization transaction, its creditors or, in any insolvency proceeding with respect to the transferor or the transferor's property, a bankruptcy trustee, receiver, debtor, debtor in possession, or similar person, to the extent the issue is governed by Alabama law, shall have no rights, legal or equitable, whatsoever to reacquire, reclaim, recover, repudiate, disaffirm, redeem, or recharacterize as property of the transferor any property, assets, or rights purported to be transferred, in whole or in part, by the transferor; and

(3) In the event of a bankruptcy, receivership, or other insolvency proceeding with respect to the transferor or the transferor's property, to the extent the issue is governed by Alabama law, such property, assets, and rights shall not be deemed to be part of the transferor's property, assets, rights, or estate.

(b) Nothing contained in this chapter shall be deemed to require any securitization transaction to be treated as a sale for federal or state tax purposes or to preclude the treatment of any securitization transaction as debt for federal or state tax purposes or to change any applicable laws relating to the perfection and priority of security or ownership interests of persons other than the transferor, hypothetical lien creditor or, in the event of a bankruptcy, receivership, or other insolvency proceeding with respect to the transferor or its property, a bankruptcy trustee, receiver, debtor, debtor in possession, or similar person

Section 35-10A-3

Any act which becomes effective after September 12, 2001, shall not be construed to amend or repeal any provision of this chapter unless the subsequent act specifically references this chapter and states that this chapter is repealed or states the manner in which this chapter is to be amended. Without limiting the foregoing, Act 2001-481, 2001 Regular Session, does not amend or repeal any provision of this chapter.

B.2.2. Choice of Law Rules of Article 9 Uniform Commercial Code (U.C.C.)

1972 and 2002 versions of Uniform Commercial Codes (U.C.C.) are the relevant codes for treatment states. Below is Chapter 3 of Section 9-103 of 1972 Official Text and Comments of Article 9 Secured Transactions.

Section 9-103. Perfection of Security Interests in Multiple State Transactions

(3) Accounts, general intangibles and mobile goods.

(a) This subsection applies to accounts (other than an account described in subsection (5) on minerals) and general intangibles and to goods which are mobile and which are of a type normally used in more than one jurisdiction, such as motor vehicles, trailers, rolling stock, airplanes, shipping containers, road building and construction machinery and commercial harvesting machinery and the like, if the goods are equipment or are inventory leased or held for lease by the debtor to others, and are not covered by a certificate of title described in subsection (2).

(b) The law (including the conflict of laws rules) of the jurisdiction in which the debtor is located governs the perfection and the effect of perfection or non-perfection of the security interest.

(c) If, however, the debtor is located in a jurisdiction which is not a part of the United States, and which does not provide for perfection of the security interest by filing or recording in that jurisdiction, the law of the jurisdiction in the United States in which the debtor has its major executive office in the United States governs the perfection and the effect of perfection or non-perfection of the security interest through filing. In the alternative, if the debtor is located in a jurisdiction which is not a part of the United States or Canada and the collateral is accounts or general intangibles for money due or to become due, the security interest may be perfected by notification to the account debtor. As used in the paragraph, "United States" includes its territories and possessions and the Commonwealth of Puerto Rico.

(d) **A debtor shall be deemed located at this place of business if he has one, at his chief executive office if he has more than ones place of business, otherwise at this residence.** If, however, the debtor is a foreign air carrier under the Federal Aviation Act of 1958, as amended, it shall be deemed located at the designated office of the agent upon whom service of process may be made on behalf of the foreign air carrier.

Below is the official comment (e) for the section above.

(e) "Chief executive office" does not the mean the place of incorporation; it means the place from which in fact the debtor manages the main part of his business operations. This is the place where persons dealing with the debtor would normally look for credit information, and is the appropriate place for filing.

As seen above, the 1972 version of U.C.C. defines the debtor location to be the location of the Chief Executive Office, which makes the the treatment state to be the state where the headquarters is located. The official comment explicitly states that the Chief Executive Office does not mean the place of incorporation. The 2002 version of U.C.C. changes the location of debtor to be the state of incorporation for registered organizations, as stated below.

Section 9-307. Location of Debtor

(a) "Place of business."

In this section, "place of business" means a place where a debtor conducts its affairs.

(b) Debtor's location: general rules.

Except as otherwise provided in this section, the following rules determine a debtor's location:

(1) A debtor who is an individual is located at the individual's principal residence.

(2) A debtor that is an organization and has only one place of business is located at its place of business.

(3) A debtor that is an organization and has more than one place of business is located at its chief executive office.

(c) Limitation of applicability of subsection (b).

Subsection (b) applies only if a debtor's residence, place of business, or chief executive office, as applicable, is located in a jurisdiction whose law generally requires information concerning the existence of a nonpossessory security interest to be made generally available in a filing, recording, or registration system as a condition or result of the security interest's obtaining priority over the rights of a lien creditor with respect to the collateral. If subsection (b) does not apply, the debtor is located in the District of Columbia.

(d) Continuation of location: cessation of existence, etc.

A person that ceases to exist, have a residence, or have a place of business continues to be located in the jurisdiction specified by subsections (b) and (c).

(e) Location of registered organization organized under State law.

A registered organization that is organized under the law of a State is located in that State.

Section 9-102. Definitions and Index of Definitions

(70) "Registered organization" means an organization organized solely under the law of a single State or the United States and as to which the State or the United States must maintain a public record showing the organization to have been organized.

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