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ECGI Working Paper Series in Finance

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Exploiting a bankruptcy reform in Korea, I examine differences in firms' financing and investment decisions under a receivership and a management stay system. Under the receivership system, incumbent management is replaced by a court-appointed trustee, who sells the firm to new investors. Under the post-reform management stay system, incumbent management stays in control during bankruptcy proceedings. I find that firms curb risk-taking under the receivership system. Specifically, firms take on lower leverage, forego risky investment, and reduce innovation. These effects are strongest for firms in which private benefits of control are large and managers face high personal bankruptcy costs.

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Managers' Personal Bankruptcy Costs and Risk-Taking*

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March 29, 2018

Abstract

Exploiting a bankruptcy reform in Korea, I examine differences in firms' financing and investment decisions under a receivership and a management stay system. Under the receivership system, incumbent management is replaced by a court-appointed trustee, who sells the firm to new investors. Under the post-reform management stay system, incumbent management stays in control during bankruptcy proceedings. I find that firms curb risk-taking under the receivership system. Specifically, firms take on lower leverage, forego risky investment, and reduce innovation. These effects are strongest for firms in which private benefits of control are large and managers face high personal bankruptcy costs.

JEL Codes: G31, G32, G33, K00.
Keywords: Bankruptcy, benefits of control, capital structure, investment, law and economics.

1 Introduction

Pioneered by La Porta, Lopez-de Silanes, Shleifer, and Vishny (1997, 1998), several empirical studies document a positive role of stronger creditor rights in contributing to larger financial markets and economic growth. The underlying argument is compelling. If creditors expect higher recovery rates in default states, they are willing to provide more credit ex ante at a cheaper price. Consequently, advocates of strong creditor rights often argue that strengthening creditor rights leads to a Pareto improvement by expanding the available contracting space. An implicit assumption in this argument is that strengthening creditor rights does not turn existing contracts infeasible. However, due to its mandatory nature, bankruptcy law may overwrite private contracts available under a regime of weaker creditor rights. In this case, the optimality of a regime with stronger creditor rights depends on whether the set of available contracts dominates the set of contracts available under a regime with weaker creditor rights.

The theoretical literature provides several arguments in favor of strong creditor rights. Strengthening creditor rights can mitigate problems associated with incomplete contracting, such as risk-shifting and strategic default (Jensen and Meckling 1976; Townsend 1979; Diamond 1984; Gale and Hellwig 1985; Bolton and Scharfstein 1990; Skeel 1993; Hart and Moore 1998; Bebchuk 2001), or elicit managerial effort and prevent investment in inefficient, self-serving projects (Grossman and Hart 1982; Innes 1990; Zwiebel 1996). However, ex ante incentive effects of stronger creditor rights are not unambiguously benign. If bankruptcy states are costly for managers or shareholders, they may try to avoid default states to the extent that they forego positive NPV projects that involve risk (Donaldson 1969; Amihud and Lev 1981; Eberhart and Senbet 1993), leading to "a significant underinvestment problem even where the firm is solvent" (Rasmussen 1994).[1]

Considering the rich theoretical literature on ex ante effects of different bankruptcy regimes, empirical evidence on the topic is surprisingly scant. Most existing studies examine how aggregate measures of creditor protection affect the size of credit markets, with mixed results. La Porta et al. (1997, 1998), Levine (1998, 1999), Djankov, McLiesh, and Shleifer (2007), Qian and Strahan (2007), Djankov et al. (2008), and Haselmann, Pistor, and Vig (2010) find that stronger creditor rights lead to larger credit markets, whereas Acharya and

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[1]Moreover, risk-shifting in distressed firms can be exacerbated when bankruptcy states are costly for managers and shareholders (White 1989; Gertner and Scharfstein 1991).

Subramanian (2009), Acharya, Amihud, and Litov (2011), and Vig (2013) present evidence that stronger creditor rights are associated with lower firm-level leverage. While these results may appear contradictory at first, the relationship between the strength of creditor rights and the size of credit markets is likely non-monotonic. Additionally, the problem is multi-dimensional in that varying degrees of creditor protection may be optimal for different aspects of bankruptcy law design. Much of the existing evidence relies on aggregate measures of creditor rights that lump together different aspects of creditor protection. As a consequence, the empirical literature provides no direct policy implications for the design of different aspects of bankruptcy law.[2]

This paper exploits a major bankruptcy reform in Korea, the Unified Bankruptcy Act of 2005 (UBA), to assess differences in firms' financing and investment decisions under a receivership and a management stay system, and explores the role of different aspects of bankruptcy law design in shaping firms' financing and investment decisions.[3] Under the pre-reform receivership system, incumbent management is forced to resign upon bankruptcy filing, and a court-appointed trustee sells the firm to new investors. In contrast, under the post-reform management stay system, incumbent management stays in control of the firm during the reorganization process.[4] Importantly, reorganization proceedings under the UBA are based on the design of the pre-reform reorganization system for large firms. With the exception of allowing managers to stay in control of the firm during bankruptcy proceedings, all major provisions of the new reorganization process are adopted from the pre-reform system (Ko 2007; Park 2008). Thus, the UBA provides a unique setting to examine the effects of management stay in bankruptcy on firms' ex ante financing and investment decisions in an otherwise stable institutional environment.

The main identification strategy to evaluate the reform's effects compares changes in financing and investment decisions for risky firms that are sensitive to the design of bankruptcy proceedings to changes in safe firms that are less sensitive to bankruptcy proceedings. The main insight that emerges from the analysis is that firms curb risk-taking under the receivership system. Specifically, firms take on lower leverage, forego profitable investment projects

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[2]A notable exception is Vig (2013), who documents that making it easier for secured creditors to liquidate distressed firms stifles the demand for secured credit.

[3]The reform process culminating in the UBA was initiated by the IMF and the World Bank during the Asian Financial Crisis. They demanded a change in Korean bankruptcy law in accordance with "international best practice", which effectively meant convergence to U.S. law.

[4]Under the pre-reform regime, management was replaced in 95.34% of the cases, compared with only 11.86% of the cases after the reform. Ownership transfer occured in 90.91% of cases under the pre-reform system, compared to 19.09% of cases after the reform.

that involve risk, and engage less in innovation. After the reform, firms in the highest risk quintile increase leverage by 3.36 percentage points more than firms in the lowest risk quintile. Additionally, their investment to assets ratio increases by 2.68 percentage points more than for safe firms, and risky firms' R&D spending to assets ratio increases by 0.52 percentage points more than for safe firms. Moreover, interest rates relatively increase by 100 basis points for risky firms after the reform. The increase in quantity (leverage) and price (interest rates) suggests an increase in the demand for credit under the management stay system.

Higher leverage and investment under the management stay system may stem from different channels. The preservation of incumbent management's firm-specific human capital, a better balance between liquidation and reorganization, or lower direct bankruptcy costs may reduce overall bankruptcy costs under management stay, increasing firms' willingness to implement financing and investment policies that imply a higher risk of default. Additionally, managers and (controlling) shareholders may be more willing to tolerate a higher probability of entering bankruptcy states under a management stay system where their personal bankruptcy costs are lower.

The empirical setting in this paper allows me to explore some of these potential channels directly. To examine the role of managers' and controlling shareholders' personal bankruptcy costs in explaining changes in leverage and investment, I exploit cross-sectional variation in the UBA's effect on managers' and controlling shareholders' personal bankruptcy costs. Loss of control under the pre-reform receivership system is particularly costly in firms with concentrated ownership in which private benefits of control are large.[5] Consistent with this conjecture, I find that the increase in leverage and investment after the reform is significantly higher for firms with more concentrated ownership, which suggests that private benefits of control play an important role in shaping firms' reduced willingness to take risk under the receivership system when ownership transfer in bankruptcy is common.

Since managers' wealth is more concentrated in the firm, managers tend to be more risk-averse than diversified shareholders (Jin 2002), and have a preference for financing and investment strategies that reduce the risk of default.[6] Wealth concentration tends to be higher for managers who hold a larger fraction of the firm's stocks (Jensen and Meckling 1976; Friend and Lang 1988). In the case of forced resignation in bankruptcy, these man-

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[5]Nenova (2003) and Dyck and Zingales (2004) document that private benefits of control are large in Korea (16–48% of firms' market capitalization).

[6]Leland and Pyle (1977), May (1995), Tufano (1996), Gormley and Matsa (2011), Graham, Harvey, and Puri (2013), and Koudijs and Salisbury (2016).

agers experience simultaneous shocks to their labor income and financial wealth. Exploiting cross-sectional differences in CEOs' inside ownership share, I find that risky firms with higher CEO shareholdings increase leverage and investment more after the reform. Additionally, for managers at an earlier stage of their career career concerns are more important as they stand to forego a longer time-series of future labor income in case of dismissal.[7] I find that firms run by younger managers experience a higher increase in leverage and investment after the reform when managers are allowed to stay in control of the firm during bankruptcy proceedings. Together, this suggests that personal bankruptcy costs are an important consideration for managers and controlling shareholders when determining firm policies, and allowing managers and controlling shareholders to stay in control during bankruptcy proceedings increases firms' willingness to take risk.

Sustaining managers' non-substitutable firm-specific human capital under the management stay system may also increase firms' willingness to pursue riskier financing and investment policies. However, this is inconsistent with revealed preferences. Under the receivership system, the rehiring of incumbent management by new owners is virtually non-existent. This suggests that firms do not consider retaining managers' firm-specific human capital as critical. Lower overall bankruptcy costs may also contribute to higher demand for debt under the management stay system. While direct bankruptcy costs are higher under the management stay system, due to lengthy court-supervised negotiations, the management stay system may reduce bankruptcy costs by striking a better balance between reorganization and liquidation. The receivership system allows new investors to either liquidate or continue the firm, whichever they deem optimal. Thus, since new investors have the option to optimally continue or liquidate the firm, it is unlikely that the receivership system leads to an inferior balance between liquidation and reorganization. Additionally, the increase in the cost of credit after the reform is inconsistent with lower overall bankruptcy costs.

An important question is whether firms' higher willingness to take risk under the management stay system is economically efficient. Firms' willingness to take risks in the pursuit of profitable investment opportunities is a fundamental driver of long-run economic growth (De-Long and Summers 1991; Acemoglu and Zilibotti 1997; Baumol, Litan, and Schramm 2007; John, Litov, and Yeung 2008). Lowering managers' and controlling shareholders' personal bankruptcy costs to increase their willingness to take risk could reduce underinvestment in positive NPV projects and contribute to economic growth (Rasmussen 1994). However, low

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[7]In the sample of bankruptcy cases in the paper, not a single manager returns to a management-level position after layoff in pre-reform bankruptcy proceedings.

personal bankruptcy costs, by reducing the disciplining effect of costly bankruptcy states, may induce firms to engage in inefficient overinvestment or increase risk-shifting incentives (Jensen 1986; Harris and Raviv 1990; Skeel 1993; Zwiebel 1996).[8]

Evaluating the efficiency of investment is challenging. To provide some suggestive evidence, I examine which type of firms undertake the additional investment under the management stay system. I find that risky firms with good investment opportunities increase investment relative more than risky firms without good investment opportunities. This suggests that the additional investment goes to profitable investment projects. Additionally, riksy firms' profits increase relatively more after the reform. Strikingly, the increase in profits is driven by the firms that increase investment most after the reform. Moreover, cash flow volatility increases more for risky firms after the reform. These effects are significantly stronger for firms in which managers' and controlling shareholders' personal bankruptcy costs are higher before the reform, suggesting that lower investment under the receivership system is driven by a lack of firms' willingness to invest in riskier projects when managers' and controlling shareholders' personal bankruptcy costs are high. This results suggest that the threats of job loss and ownership transfer under the receivership system lead firms to forego profitable investment projects, consistent with Donaldson (1969), Amihud and Lev (1981), and Rasmussen (1994).

Given the potentially foregone investment in positive NPV projects under the receivership system, a natural question is why firms and investors cannot contract around inefficiencies. While alternative contracting solutions may mitigate some of the effects of high personal bankruptcy costs for managers and shareholders, there are limitations to these alternative contracting solutions to fully undo incentive effects from forced management resignation and owernship transfer in bankruptcy, which are discussed in detail in Section 7.

The empirical analysis in this paper contributes to the literature on optimal bankruptcy law design. The UBA provides a unique opportunity to compare firms' financing and investment decisions under the most common corporate reorganization proceedings, a receivership and a management stay system, in an otherwise stable institutional environment. The analysis suggests that firms curb risk-taking under the receivership system. Forced management resignation and ownership transfer seem to be important aspects in reducing risk-taking under the receivership system. This in turn suggests that reducing managers' and controlling

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[8]Nini, Smith, and Sufi (2009) find that firm value increases after firms sign a new debt contract with a restriction on investment, suggesting that creditor control can reduce value-destroying overinvestment.

shareholders' personal bankruptcy costs in bankruptcy encourages corporate risk-taking. Additionally, the paper provides suggestive evidence that lower risk-taking under the receivership system leads firms to forego profitable investment opportunities that involve risk.

The results in this paper also provide evidence of an important channel that may explain the negative relationship between the level of creditor rights and corporate leverage documented in previous studies (Acharya and Subramanian 2009; Acharya, Amihud, and Litov 2011; Vig 2013). While these papers document a negative relationship between stronger creditor rights and leverage, they are silent about the channel through which stronger creditor rights affect firms' demand for credit. The existing evidence on the effect of management stay on firms' demand for credit is from a cross-country study by Acharya, Amihud, and Litov (2011). By exploiting exogenous variation in management stay, isolated from other major changes to bankruptcy proceedings, this paper provides evidence on the effects of management stay on corporate risk-taking in a setting less subject to concerns about confounding factors compared to cross-country studies. Additionally, in contrast to this paper, Acharya, Amihud, and Litov 2011 examine the effect of creditor rights on the amount of credit financing and corporate risk-taking, but do not assess efficiency implications of lower corporate risk-taking in the absence of management stay.

Due to the design of the receivership system in Korea before 2006, in which the firm is sold to new investors upon bankruptcy filing, the results in the paper also relate to the analysis of auction systems in corporate bankruptcy.[9] Empirical evidence on the effects of ownership transfer in bankruptcy is scarce. Strömberg (2000), Thorburn (2000), and Eckbo and Thorburn (2003) provide evidence from Sweden, which uses an auction system in bankruptcy. In terms of ex post efficiency, they argue that the auction system does not lead to excessive liquidation, honors the priority of claims, and is quicker and less costly than U.S. Chapter 11 cases. This paper contributes to the literature by assessing of how ownership transfer in bankruptcy affects firms' financing and investment decisions *ex ante*. Specifically, the results in the paper imply that ownership transfer in bankruptcy may reduce corporate risk-taking leading to lower leverage, investment, and innovation.

The paper also relates to the literature on the impact of managerial risk-aversion on firms' financing and investment decisions. Since managers tend to be more risk-averse than diversified shareholders, it is often argued that increasing managers' willingness to take on

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[9]Baird (1986), Bebchuk (1988), and Aghion, Hart, and Moore (1992) discuss auction mechanisms in bankruptcy theoretically.

additional idiosyncratic risk, for example through option grants or golden parachutes, can improve shareholder value.[10] Consistent with the view that managers are concerned about idiosyncratic risk, the results show that higher personal bankruptcy costs lead managers to curb risk-taking. Thus, in cases where managers take on too little risk, a bankruptcy law that imposes high personal bankruptcy costs may aggravate the problems.

An important question is how generalizable the results in the paper are to other institutional environments. The results are likely to apply in countries with high levels of family or concentrated ownership where private benefits of control are large. Concentrated and family ownership is the most common form of ownership structure in mid-income and developing countries (La Porta, Lopez-de Silanes, and Shleifer 1999; Claessens, Djankov, and Lang 2000; Faccio and Lang 2002). Additionally, family and concentrated ownership is also prevalent in most developed countries, even in the U.S. (Anderson and Reeb 2003; Villalonga and Amit 2006; Holderness 2009). Thus, private benefits of control are an important consideration for shareholders and managers in a large fraction of firms around the world, which suggests that the documented results are relevant beyond the specific context in this paper.

2 Institutional Background

This section provides a brief summary of the legislative history of the Unified Bankruptcy Act (UBA) and describes the main changes in corporate bankruptcy proceedings. Additionally, it documents evidence on the real effects of the law on bankruptcy filings and on outcomes in in-court reorganizations and out-of-court workouts.

2.1 Legislative History

On March 31, 2005, President Rho Moo-Hyun proclaimed the UBA, which, as of April 1, 2006, replaced four separate laws governing corporate liquidation, corporate reorganization proceedings, and personal bankruptcy. The reform process leading to the UBA was triggered by the Asian Financial Crisis in 1997. In exchange for financial aid, the IMF and the World Bank demanded (among other changes) a modernization of bankruptcy laws in accordance

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[10]E.g., Gormley and Matsa (2011), Gormley and Matsa (2016), and Koudijs and Salisbury (2017).

with international best practice, which in essence meant with U.S. bankruptcy law.[11] While other reforms were implemented more immediately, the bankruptcy reform process spanned eight years.

Following the IMF's intervention, existing bankruptcy laws underwent amendments to increase transparency and efficiency in 1998 and the Korean Government and the IMF agreed that a new comprehensive bankruptcy law was necessary. In 1999, with World Bank funding, the Ministry of Justice gathered a group of consultants, led by a Korean (Shin and Kim) and an American law firm (Orrick, Herrington & Sutcliffe). In December 2000, the group submitted a first draft outlining several different policy options to the Ministry of Justice. A Ministry of Justice drafting team circulated different drafts to judges, the Korean bar association, and the bankers' association over the course of the period from 2001 to 2003, for comments and feedback. After submitting the final draft of the new law, due to critical comments from the Judiciary Committee, the draft was substantially revised and introduced to the National Assembly in late 2004. Finally, the National Assembly enacted the UBA in March 2005. As demanded by the IMF and World Bank, the resulting law bore close resemblance to U.S. bankruptcy law, as introduced in the Bankruptcy Reform Act of 1978.

2.2   Changes in Bankruptcy Law

Before the UBA, two separate proceedings regulated corporate restructuring. Under the Composition Act, intended for usage by small firms with simple debt structures, a restriction that was strictly applied from 1998 (Park 2005), incumbent management stayed in control of the firm and developed a plan for restructuring.[12] Since composition filings only apply to small firms, they are mostly irrelevant for sample in this paper. Under the Corporate Reorganization Act, bankruptcy filing triggered the replacement of incumbent management by a court-appointed trustee.[13] While the restructuring proceeding was a receivership system on paper, it was standard practice for the court-appointed trustee to engage in a sales process upon bankruptcy filing, resembling an auction system (Ko 2007).

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[11]Other countries affected by the Asian financial crisis also underwent bankruptcy reform in the aftermath of the crisis on initiative of the IMF (Indonesia in 1998, Thailand in 1998/1999).

[12]If the court considered that a firm was too large or that its debt structure was too complex, it changed the composition filing into a reorganization or liquidation filing (Park 2005). Park (2008) notes that many companies that applied for composition were transferred to liquidation proceedings. Composition filings occurred only rarely after 1998.

[13]Park (2008): "The incumbent management might be appointed as a trustee [...], but in practice, there were virtually no cases in which the incumbent management managed to keep their positions."

The UBA merged the two separate reorganization laws governed by the Corporate Reorganization Act (CRA) and the Composition Act into a single rehabilitation proceeding. The new rehabilitation procedure conserved most features of the CRA that only applied to larger firms before the reform. Thus, the merger effectively meant the abolition of the composition procedure (Ko 2007, Halliday and Carruthers 2009). However, while the new rehabilitation procedure mostly adopted the CRA, the main change concerned the treatment of incumbent management during the reorganization process. Whereas under the CRA incumbent management was replaced by a court-appointed trustee, following demands from the IMF and World Bank, the new rehabilitation procedure introduced a management stay system that allowed debtor-management to remain in control and negotiate a restructuring plan with the firm's creditors under court supervision. In effect, instead of appointing an external receiver, the court appointed the incumbent manager as receiver under the UBA. Specifically, following a rehabilitation filing the court appoints the incumbent management as receiver, except for cases in which: financial distress can be attributed to fraudulent activity on the part of management, the company's creditors provide reasonable grounds for appointing a third-party receiver, or the court considers the appointment of a third-party receiver essential for the rehabilitation procedure. In practice, incumbent management remained in control in virtually all rehabilitation cases (Ko 2007).

The UBA had dramatic effects on managers and owners of bankrupt firms. In 88.14 percent of the rehabilitation cases in the sample, the CEO remained in control of the firm under the post-reform management stay regime, compared to only 4.76 percent of the cases under the pre-reform regime (see Table 1, Panel A).[14] Under the pre-reform reorganization system, ownership transfer occurred in 90.91 percent of the cases in the sample that did not result in liquidation, whereas under the management stay system ownership was transferred to new investors in only 19.09 percent of the cases. This change in the treatment of management and controlling shareholders significantly reduced their personal bankruptcy costs. Eckbo, Thorburn, and Wang (2016) document that CEOs who stay in management following filing for Chapter 11 in the U.S. experience no change in future compensation, whereas CEOs who are forced to exit the firm experience a combined loss in equity value and foregone future compensation of $18.2 million, which is equivalent to more than twelve times their pre-departure income. As a consequence of the reduction in adverse effects on managers and controlling shareholders firms became more likely to file for in-court reorganization under

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[14]In the sample of bankruptcy cases in this paper, no CEO returns to a senior management position after being forced to resign following a bankruptcy filing under the pre-reform receivership system.

the management stay system (Ko 2007; Park 2008; Halliday and Carruthers 2009). Reorganization filings increased from 57 in 2005 to 117 in 2006 and 215 in 2007 (Table 1, Panel B). In contrast, liquidation filings did not increase during this time period, suggesting that the increase in reorganization filings was not driven by economic conditions.

2.3 Alternative Restructuring Mechanisms

Debtors and creditors have the option to renegotiate the firm's obligations outside of court instead of invoking official court proceedings. Since both contracting parties have the option to default to in-court reorganization procedures, the expected outcome from in-court proceedings (minus potential costs) is a benchmark for both contracting parties to reach an agreement out-of-court. Due to their private nature, it is generally difficult to obtain data on the outcomes of out-of-court renegotiations. In Korea, firms with assets over 50 billion Korean won are required to engage in supervised workouts under some conditions. This provides a sample of out-of-court workouts for which data is available.

The evidence suggests that creditors were rarely willing to compromise with managers under the pre-reform regime due to the high control they enjoyed in in-court proceedings. Creditors required the departure of incumbent management and controlling shareholders in the majority of cases[15] and private workouts were less likely to succeed before the reform (Table 1, Panel C). In 2004, the fraction of workouts that resulted in bankruptcy or liquidation was 60.00 percent, in 2005 it was 44.58 percent. After the reform, creditors' willingness to restructure firms out-of-court increased substantially, and the failure rate dropped to 22.23 percent in 2006, and 25.35 percent in 2007.

It is possible that workouts in smaller firms led to different outcomes than for large firms required to file for official workout proceedings. Anecdotal evidence on workout proceedings for the period from June 2004 when smaller firms were also required to register their workout proceedings suggests that smaller firms were hesitant to engage in workouts, as management and shareholders resented the loss of control in workout proceedings.[16] Overall, the evidence from private workouts suggests that workouts did not remedy the high costs of bankruptcy states for managers and controlling shareholders before the UBA.

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[15] For 84 percent of cases in official workouts in 2001, the CEO was forced to resign (Financial Supervisory Service of Korea 2001).

[16] Money Today, August 8, 2004, 'Bank-SME Workouts in Slump'.

3 Theoretical Framework

This section presents a stylized model of debt financing motivated by the institutional environment in Korea, to provide a theoretical framework for the empirical analysis.

3.1 Investment Opportunity

Consider a cashless firm with assets in place. There are four periods ($t = 0, 1, 2, 3$). Cashflows are not verifiable and there is no discounting. In period $t = 0$, the firm can invest in a positive NPV project that yields either C_1^H with probability θ, or C_1^L with probability $1 - \theta$ in period $t = 1$. The project requires an investment of I in period $t = 0$ that needs to be financed by outside investors. In period $t = 2$ the firm's assets in place generate a cashflow of either C_2^H with a probability of γ, or C_2^L with a probability of $1 - \gamma$. For simplicity, let $C_1^H = C_2^H = C^H$ and $C_1^L = C_2^L = C^L$. In period $t = 3$, the firm's assets in place generate a cashflow of C_3, which can be viewed as the long-run (expected) value of the firm.[17] Figure 1 depicts the cashflows generated by the firm. The firm is run by an entrepreneur who also owns the firm. If the entrepreneur stays in control of the firm into period $t = 3$, she enjoys a private benefit B. The private benefit is not transferable to new investors. While in the model there is no distinction between ownership and management, in the context of the reform, the private benefit can be interpreted both as a benefit to the manager from running the firm (e.g., non-pecuniary benefits), as well as a benefit to shareholders (private benefits of control).

3.2 Financing Choices

I assume that the only way to finance the project is by risky short-term debt, that is $C_L < I < C^H$. Since cashflows are not verifiable, a contract that stipulates state-dependent repayments does not fulfill the revelation principle, as the firm would always have an incentive to report the state that requires lower repayments. Thus, the optimal contract requires a state-independent payment of R.[18]

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[17]I assume that C_3 cannot be pledged. This is equivalent to assuming that there is an ϵ probability that $C_3 = 0$, where ϵ is infinitesimally small.

[18]The mandatory nature of bankruptcy law does not allow creditors to randomize bankruptcy filing with different probabilities across states to alter repayment incentives.

3.3 Bankruptcy Proceedings

If the firm does not repay the debt in period $t = 1$, bankruptcy proceedings are invoked. Under the pre-reform system, creditors have the option to liquidate the firm at liquidation value L. If they choose not to liquidate the firm, the firm is sold to new investors, who will pay P, the expected value of all future cashflows.[19] I assume that liquidation is inefficient ($L < C_3$). Under the post-reform regime, the entrepreneur stays in control of the firm for one period after bankruptcy filing. Creditors can only liquidate the firm after cashflows in the next period $t = 2$ are realized and cannot sell the firm to new investors. Under the post-reform regime, the firm can use the cashflows from period $t = 2$ to repay its creditors to exit bankruptcy proceedings to prevent liquidation. The firm and the creditors can renegotiate the payment during the management stay period. The entrepreneur's payoff from keeping control of the firm beyond period $t = 2$ is $C_3 + B$, which is the maximum she is willing to pay to the creditors. The creditors' outside option is the liquidation value L. Thus, the renegotiated repayment S is between $C_3 + B$ and L and depends on the relative bargaining power of the entrepreneur and the creditors.[20] To restrict the problem to the interesting case where preventing default in the second period is optimal for the entrepreneur if the good state occurs and the increase in the expected private benefit is higher than the efficiency loss from liquidation, I assume that $2C^L < S \leq C^L + C^H$ and $\gamma B > (1 - \gamma)(C_3 - L)$.

3.4 Solutions

For the pre-reform system, the entrepreneur faces the following maximization problem, where her maximization is over the decision to invest or not ($\mathbb{1}_{inv} \in \{0, 1\}$):

$$\max_{\mathbb{1}_{inv}} \quad \mathbb{1}_{inv} \left[\theta \left[C^H + \gamma C^H + (1 - \gamma)C^L + C_3 + B - R \right] \right]$$

$$+ (1 - \mathbb{1}_{inv}) \left[\gamma C^H + (1 - \gamma)C^L + C_3 + B \right]$$

If the firm invests and the high state occurs, the firm can repay its creditors and continue operations under the entrepreneur's control. Thus, the entrepreneur retains all cashflows

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[19]For simplicity, I assume that creditors receive the full sales price P. This can be justified by assuming either that the expected value of future cashflows does not exceed R.

[20]Note that R cannot be greater than S. If R were higher than S, the firm would prefer to default and renegotiate the payment to S. Thus, a condition for the creditor to break even and financing to occur is that creditors have sufficient bargaining power such that $S \geq R$. Otherwise, the contract is not renegotiation-proof.

minus the payment to the investor and enjoys her private benefit. In the low state the payoff to the entrepreneur is zero, as the firm cannot repay its debt and will be sold to new investors (and we assumed that $P \leq R$). If the firm does not invest, the entrepreneur enjoys her private benefit from operating the firm and obtains the cashflows generated by the assets in place.

For financing to be viable, the creditors' participation constraint must be satisfied. That is, creditors need to break even to be willing to provide credit. I assume that capital markets are competitive such that the participation constraint is satisfied with equality:

$$\theta\left[R\right] + (1-\theta)\left[C^L + \gamma C^H + (1-\gamma)C^L + C_3\right] = I \qquad (IR^B_{pre})$$

which leads to a required repayment of $R_{pre} = \frac{I-(1-\theta)(\gamma C^H + (2-\gamma)C^L + C_3)}{\theta}$ for creditors to break even.

To ensure that the firm repays its creditors in the high state, the payoff after repayment must be at least as high as the payoff in the event of not repaying the creditors:

$$C^H + \gamma C^H + (1-\gamma)C^L + C_3 + B - R \geq C^H - C^L \qquad (IC^F_{pre})$$

which implies a minimum value for the private benefit of $\underline{B}_{pre} = R - 2C^L - \gamma(C^H - C^L) - C_3 = \frac{I - 2C^L - \gamma(C^H - C^L) - C_3}{\theta}$ to ensure repayment.

In order for the entrepreneur to invest in the first period, the expected payoff after investment needs to be at least as high as the expected payoff in the case of no investment. Thus, the firm's participation constraint is:

$$\theta\left[C^H + \gamma C^H + (1-\gamma)C^L + C_3 + B - R\right] \geq \gamma C^H + (1-\gamma)C^L + C_3 + B \qquad (IR^F_{pre})$$

which, after plugging in R from the solution of IC^F_{pre}, implies a maximum value for the private benefit of $\overline{B}_{pre} = \frac{\theta C^H + (1-\theta)C^L - I}{1-\theta}$. If the private benefit increases above this threshold, the entrepreneur would not be willing to invest in the project, as the expected cost from losing her private benefit would be too high.

For the post-reform system, the entrepreneur maximizes:

$$\max_{\mathbb{1}_{inv}} \mathbb{1}_{inv}[\theta \left[C^H + \gamma C^H + (1-\gamma)C^L + C_3 + B - R\right]$$

$$+(1-\theta)\gamma \left[C^H + C_3 + B - (R - C^L)\right]]$$

$$+(1 - \mathbb{1}_{inv})\left[\gamma C^H + (1-\gamma)C^L + C_3 + B\right]$$

Compared with the pre-reform period, the firm now has the option of avoiding bankruptcy in the low state, if during the reorganization period $t = 2$ the high cashflow C^H is realized.

The creditors' participation constraint becomes:

$$\theta[R] + (1-\theta)\left[\gamma R + (1-\gamma)(2C^L + L)\right] = I \qquad (IR_{post}^B)$$

which leads to a required repayment of $R_{post} = \frac{I - (1-\theta)(1-\gamma)(2C^L + L)}{\theta + (1-\theta)\gamma}$ for creditors to break even.

Proposition 1. *The cost of credit is higher under the post-reform regime: $R_{post} > R_{pre}$.*

Proof. In equilibrium, payment to creditors (R) is constrained by the high state cashflows (C_H), thus $R_{post} = \frac{I - (1-\theta)\left[C^L + \gamma R + (1-\gamma)(C^L + L) - \gamma C^L\right]}{\theta} \geq \frac{I - (1-\theta)\left[C^L + \gamma C^H + (1-\gamma)(C^L + L)\right]}{\theta}$.
From the assumption that liquidation is inefficient, i.e., $L < C_3$, it follows that
$\frac{I - (1-\theta)\left[C^L + \gamma C^H + (1-\gamma)(C^L + L)\right]}{\theta} > \frac{I - (1-\theta)\left[C^L + \gamma C^H + (1-\gamma)(C^L + C_3)\right]}{\theta} = R_{pre}$. $\qquad\square$

Under the post-reform regime, the entrepreneur's incentive constraint to repay creditors becomes:

$$2C^H + C_3 + B - R \geq 2C^H - 2C^L \qquad (IC_{post}^F)$$

which implies a minimum value for the private benefit of $\underline{B}_{post} = R_{post} - 2C^L - C_3$ to ensure repayment. Note that if (IC_F) is satisfied, the incentive constraint for the firm is also satisfied for the case when the sum of cashflows in periods $t = 1$ and $t = 2$ is $C^H + C^L$.

Proposition 2. *The minimum level of private benefits required to incentivize the entrepreneur to repay creditors and make investment feasible is higher under the post-reform regime: $\underline{B}_{post} > \underline{B}_{pre}$.*

Proof. Since equilibrium payments to creditors are lower under the pre-reform regime ($R_{post} >$

R_{pre}) and cash flows in the high state are higher than cash flows in the low state, $C_H > C_L$,

$$\underline{B}_{post} = R_{post} - 2C^L - C_3 > R_{pre} - 2C^L - C_3 > R_{pre} - 2C^L - C_3 - \gamma(C^H - C^L) = \underline{B}_{pre}. \quad \square$$

The participation constraint for the entrepreneur under the post-reform system becomes:

$$\theta \left[C^H + \gamma C^H + (1 - \gamma)C^L + C_3 + B - R \right] + (1 - \theta)\gamma \left[C^L + C^H + C_3 + B - R \right]$$
$$\geq \gamma C^H + (1 - \gamma)C^L + C_3 + B \quad (IR_{post}^F)$$

which, after plugging in R from IR_{post}^B, implies a maximum value for the private benefit of
$\overline{B}_{post} = \frac{\theta C^H + (1-\theta)C^L - I}{1-\theta} \cdot \frac{1}{1-\gamma} + (L - C_3)$.

Proposition 3. *The maximum level of private benefit under which the entrepreneur is willing to finance the project with risky debt is higher under the post-reform regime: $\overline{B}_{post} > \overline{B}_{pre}$.*

Proof. From the assumption that the increase in the expected private benefit from the higher probability of the entrepreneur staying in control in the high state is larger than the efficiency loss from liquidation in the low state ($\gamma B > (1 - \gamma)(C_3 - L)$), it follows that
$\overline{B}_{post} = \frac{\theta C^H + (1-\theta)C^L - I}{1-\theta} \cdot \frac{1}{1-\gamma} + (L - C_3) = \overline{B}_{pre} \cdot \frac{1}{1-\gamma} - (C_3 - L) > \overline{B}_{pre}. \quad \square$

Proposition 4. *The higher the liquidation value L, the smaller the difference between $\underline{B}_{post}$ and $\underline{B}_{pre}$, the larger the difference between $\overline{B}_{post}$ and $\overline{B}_{pre}$, and the lower the difference between R_{post} and R_{pre}.*

Proof. The pre-reform values R_{pre}, $\underline{B}_{pre}$, and $\overline{B}_{pre}$ are independent of L. For the post-reform period, $\frac{\partial R_{post}}{\partial L} = -\frac{(1-\theta)(1-\gamma)}{(1-\theta)\gamma+\theta} < 0$, $\frac{\partial \underline{B}_{post}}{\partial L} = -\frac{(1-\theta)(1-\gamma)}{(1-\theta)\gamma+\theta} < 0$, and $\frac{\partial \overline{B}_{post}}{\partial L} = 1 > 0$. $\quad \square$

3.5 Discussion

The shift from the pre-reform receivership system to the post-reform management stay system has two main implications for the entrepreneur's incentives, which can be interpreted as both managers' and controlling shareholders' incentives. First, higher expected payoffs in default states, stemming from the reduced likelihood of losing control over the firm and therefore losing her private benefit B, weakens the entrepreneur's incentive to repay creditors. This leads to a higher minimum level of the private benefit required to incentivize the entrepreneur to repay creditors and make investment feasible. Second, the possibility for the

entrepreneur to stay in control of the firm through financial distress under the management stay system makes the entrepreneur more willing to undertake risky investment, as the risk of losing her private benefit is reduced. This makes it easier to fulfill the entrepreneur's participation constraint, even when private benefits are large.

Together, these factors imply a shift of the investment region (see Figure 2). For low levels of private benefits, investment is only feasible under the pre-reform receivership system. For intermediate levels of private benefits, investment may be feasible under both the pre-reform receivership and the post-reform management stay system.[21] For high levels of private benefits, investment only occurs under the post-reform management stay system. This implies that firms in which private benefits are large are more likely to invest under the management stay system. In contrast, for firms in which private benefits are low, the weaker incentives to repay creditors under the post-reform management stay system lead to less financing being available to undertake investment. Whether the level of investment in the economy is higher before or after the reform depends on the importance of private benefits and is ultimately an empirical question.

The shift from the pre-reform receivership system to the post-reform management stay system has a clear prediction for the cost of credit. Before the reform, when creditors experience higher recovery in default, they demand lower payments in other states. Thus, pre-reform repayments R_{pre} are lower than post-reform repayments R_{post}. The effect is mitigated when liquidation values L are higher, as this increases payments to creditors in default states under the post-reform regime and therefore lowers repayments in other states.

4   Data

This section describes the data used for the empirical analysis in this paper. I obtain data on corporate bankruptcy filings from the Korea Information Service (KIS). Data on bankruptcy filings is merged with accounting data from financial statements of Korean firms submitted to the Financial Supervisory Commission and processed by KIS.[22]

Descriptive statistics are gathered in Table 2, separately for the full sample and for the

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[21]The investment regions need not overlap. Depending on the parameter values, there may be intermediate levels of private benefits for which investment is infeasible under both regimes.

[22]Firms with assets of more than seven billion Korean won are required to submit financial statements to the FSC.

riskiest and safest quintiles of firms based on their measure of interest coverage.[23] Following standard practice, I drop utility and financial firms. The average firm has total assets of 78,977 million Korean won.[24] Firms in the highest default risk quintile are smaller on average with 65,275 million won, compared to firms in the safest quintile with 173,466 million won. The average debt to asset ratio in the sample is 34.48 percent, with 48.24 percent for the riskiest firms and 12.54 percent for the safest firms. Interest rates are higher for risky firms with 9.69 percent compared to 4.16 percent for safe firms. The average cash to asset ratio is 7.28 percent, with 5.88 percent for the riskiest and 13.22 percent for the safest firms. Finally, firms' investment divided by assets is 6.51 percent for the average firm. Risky firms' investment to assets ratio is 4.35 percent, compared with 7.97 percent for the safest firms.

Data on patents is available from the Korea Intellectual Property Rights Information Service. This data includes all patent applications and indicates whether a patent was granted. There are 25,812 firm-year observations in which a firm successfully applies for at least one patent. The average number of succesful annual patent applications for the full sample is 11.04. For the safest quintile of firms, the average number of patent applications is 26.14, while for the riskiest firms the average number is 9.77. The high level of innovation even in risky firms highlights the importance of the design of bankruptcy law for innovation.

KIS collects ownership data from firms' annual reports. Panel C provides descriptive statistics on ownership concentration and CEO ownership. The data provides information on ownership of related firms which allows to compute the ultimate ownership for all relevant parties. Ownership concentration is defined as the Herfindahl index of individual shareholders' ownership shares. CEO ownership is the fraction of the firm's shares owned by CEOs and their family. The Herfindahl index of ownership concentration for the average firm in the sample is 0.4243. Ownership concentration is higher for the safest quintile of firms with 0.4332 than for the riskiest firms with 0.3978. This is consistent with the literature on family firms that finds that concentrated family ownership is negatively correlated with firm risk (Anderson, Mansi, and Reeb 2003; John, Litov, and Yeung 2008; Paligrova 2010). Average CEO ownership in the sample is 32.81%, with a higher CEO ownership fraction in safe firms with 31.34% and a lower CEO ownership share in risky firms with 23.29%. This is consistent with higher CEO wealth concentration being associated with lower firm risk.

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[23]For firms with zero debt, interest coverage is not defined. These firms could be very safe firms, but also risky firm that are unable to access credit markets. While I drop these firms from the sample, all results in the paper hold when adding these firms to the safest or riskiest quintile of firms.

[24]As a rule of thumb, 1,000 Korean won correspond to about one US dollar.

Finally, KIS also provides data on executives' background for a large subset of firms, including employment information and their birthdate. Panel D depicts descriptive statistics on CEOs' age. The average age of CEOs in the sample is 51.39 years, with an average ago of 50.53 years for CEOs in the riskiest twenty percent of firms, and 51.74 years for CEOs in the safest twenty percent of firms.

5   Empirical Strategy

This section describes the empirical strategy employed to assess differences in firms' financing and investment decisions under the receivership and the management stay system.

The main identification strategy examines changes in financing and investment decisions for firms that are the most sensitive to bankruptcy law design (risky firms), and firms that are least sensitive to changes in bankruptcy law (safe firms). This empirical strategy implies the following regression equation:

$$
\begin{aligned}
DebtA_{it} \quad = \quad & \alpha + \alpha_{ind,t} + \gamma \cdot controls_{it-1} + \beta_1 \cdot DR_{it-1} + \beta_2 \cdot event_t \qquad (1) \\
& + \beta_3 \cdot DR_{it-1} * event_t + \epsilon_{it}
\end{aligned}
$$

where $DebtA_{it}$ is firm i's debt to asset ratio in year t, $controls_{it-1}$ denotes a set of lagged control variables that are commonly found to affect leverage, DR_{it-1} is a rank variable ranging from one for the safest quintile to five for the riskiest quintile of firms based on firms' interest coverage measure, which is a simple measure of default risk that can be computed for both public and private firms.[25] The dummy variable $event_t$ takes the value of zero before (2001–2005), and one after (2006–2010) the reform.

To assess the reform's effect on firms' investment decisions and the cost of credit, I follow the same estimation strategy, replacing the dependent variable with investment scaled by assets ($InvA_{it}$) and interest payments scaled by total debt (IR_{it}), respectively. The parameter of interest is β_3, which compares outcomes for risky firms relative to safe firms before and after the reform. Industry-year fixed-effects $\alpha_{ind,t}$ control for industry-specific shocks. Thus, equation (1) compares changes in leverage for risky and safe firms within the same industry in a given year.

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[25]The results in the paper are robust to alternative measures of risk. All results in the paper are qualitatively identical when estimating the probability of default based on observable firms characteristics in the spirit of Altman (1968).

A concern when comparing firms in different bankruptcy regimes is that exposure to the regime endogenously affects which firms become risky. In the specific context of this paper, firms classified as safe and risky firms before the reform may systematically differ from firms classified as safe and risky firms after the reform in terms of unobserved characteristics that are correlated with the outcome measures. One common way to address this problem is by measuring DR_i during the pre-event period and saturating the specification with firm fixed effects, to absorb differences in time-invariant unobserved firm characteristics. However, this methodology implicitly assumes that either the sorting variable is persistent, or the sorting variable is not correlated with the dependent variable. If both assumptions are violated, this type of sorting introduces an estimation bias in β_3.

To illustrate this problem, consider leverage as the dependent variable. Default risk is strongly correlated with leverage, and the average *surviving* firm sorted into the high default risk quintile before the reform experiences a decrease in default risk after the reform, due to a survivorship and mean-reversion bias. Firms sorted into the high default risk group before the reform either improve their financial situation by generating high profits or by restructuring their debt, or they default and exit the sample. Thus, the average *surviving* firm is less risky after the reform and has lower leverage. This implies that β_3 would be biased downwards. In the same way, the estimation of β_3 would be biased for investment and the cost of credit when sorting firms into default risk quintiles before the reform, with the sign of the bias depending on the correlation with default risk.

To overcome this problem, I implement an alternative estimation strategy to control for unobservable firm characteristics that may affect the estimation of β_3 in equation (1), following the tripple-difference approach in Becker and Stromberg (2012). I sort firms into quintiles according to their default risk measure in 2001 and 2005 separately and estimate equation (1) separately for the 2001–2004 period and the 2005–2008 period. The basic idea underlying this approach is to compare changes in outcomes after the reform for firms sorted in 2005, the year before the reform, while controlling for effects of survivorship bias and mean-reversion through comparison to an identical placebo test for firms sorted in 2001. Estimating changes in the outcome measure in the three years after sorting for firms sorted into default risk quintiles in 2001 and 2005 provides two estimates for $\hat{\beta}_3$, one for the 2001–2004 "placebo" event period ($\hat{\beta}_3^{placebo}$), and one for the 2005–2008 reform period ($\hat{\beta}_3^{reform}$). Provided that the survivorship bias and mean reversion are similar after 2005 and after 2001, the difference $\hat{\beta}_3^{reform} - \hat{\beta}_3^{placebo}$ cancels out the estimation bias, delivering

an unbiased estimate $\hat{\beta}_3^{unbiased}$.[26] This is equivalent to estimating $\hat{\beta}_3^{unbiased}$ directly from:

$$
\begin{aligned}
DebtA_{it} = {} & \alpha + \alpha_t + \alpha_{i,UBA} + \gamma \cdot controls_{it-1} + \beta_1 \cdot DR_i + \beta_2 \cdot event_t \\
& + \beta_3 \cdot DR_i * event_t + \beta_4 \cdot reform_t + \beta_5 \cdot DR_i * reform_t \qquad (2) \\
& + \beta_6 \cdot event_t * reform_t + \beta_7 \cdot DR_i * event_t * reform_t + \epsilon_{it}
\end{aligned}
$$

where UBA_t is one for the 2005–2008 period and zero for the 2001–2004 (or 2010–2013) period. Then, $\hat{\beta}_7 = \hat{\beta}_3^{reform} - \hat{\beta}_3^{placebo} = \hat{\beta}_3^{unbiased}$.[27]

6 Results

This section presents and discusses the main results from estimating equations (1) and (2), and presents results from cross-sectional analysis that strengthens the interpretation of the main results and provides additional insights into the underlying channels.

6.1 Reform Effect

The top panel in Figure 3 depicts the time-series evolution of firms' debt to assets ratio for the riskiest (black line) and the safest (gray line) firms. While the UBA has no effect on the safest firms' debt to asset ratio, risky firms' debt to asset ratio increases sharply after the reform comes into effect in 2006. The bottom panel of Figure 3 shows that the effect of the UBA increases monotonically with default risk. Figure 4 shows the same plots for firms' interest expenses to debt ratio. Interest rates of risky firms start to increase from 2006 (black line), whereas safe firms' interest rates remain unchanged.[28] As for leverage, the change in interest rates after the reform increases monotonically with default risk. The combination of an increase in quantity (leverage) and prices (interest rates) suggests that the increase in leverage under the management stay system is due to an increase in the demand for credit. Figure 5 depicts the same plots for firms' investment to assets ratio. Risky firms' investment

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[26]Additionally, I sort firms at the end of the sample period in 2010 and estimate equation (1) for the 2010-2013 period, to obtain an alternative estimate for $\hat{\beta}_3^{placebo}$. This mitigates concerns that survivorship bias might be different before and after the reform.

[27]As an additional robustness test, I sort firms according to the riskiness of the industry in which they operate.

[28]Since the proxy for interest rates is a mixture of newly issued and existing debt in a given year, the change in interest rates after the reform in not fully reflected immediately.

to asset ratio starts to increase significantly after 2006 (black line), whereas for safe firms investment stays constant. Investment increases monotonically with default risk after the reform as well. The graphical evidence from Figures 3 to 5 show that changes in leverage, interest rates, and investment for risky firms coincide with the enactment of the UBA, and that the effects are monotonically increasing in firms' likelihood of entering default states.

I confirm the insights from the graphical analysis statistically by estimating equation (1).[29] The results are displayed in Table 3. The estimates in column I are the statistical equivalent to Figure 3. After the introduction of the UBA, leverage increases by 2.49 percentage points more per risk quintile. To account for the possibility of a systematic change in industry composition or other observable firm characteristics in the groups of risky firms after the reform, column II adds industry fixed effects and firm-level controls. This reduces the magnitude of the reform effect to 0.76 pp per default risk quintile. The strictest specification in column III includes industry-year fixed effects to control for industry-specific shocks, which leaves the results unaffected with 0.84 pp per default risk quintile. In columns IV to VI, I replace the dependent variable with firms' interest expenses scaled by total debt. Interest rates increase for risky firms after the UBA relative to safe firms by 34 basis points per risk quintile (column IV). The results are similar when adding firm controls and industry fixed effects with 31 bp per risk quintile (column V), and after including industry-year fixed effects with 25 bp per risk quintile (column VI). Columns VII to IX show the results for investment. After the enactment of the UBA, firms' investment to assets ratio increases by 0.87 pp more per default risk quintile (column VII). Adding industry fixed effects and controls slightly reduces the effect to 0.60 pp (column VIII). With industry-year fixed effects, the reform effect is 0.67 pp per risk quintile (column IX). These results suggest that risky firms use a large fraction of the additional credit for investment.

A large fraction of firms in Korea belong to business groups. Since these firms are more insulated from default risk through internal capital markets in these business groups (Gopalan, Nanda, and Seru 2007), sorting them into default risk quintiles based on their measure of interest coverage without taking into account business group connections may bias the results. To assess this possibility, I estimate equation (1) excluding all firms for which the ownership data includes another firm among its shareholders. The results are gathered in Table 4. Excluding firms connected to business groups makes the results somewhat stronger,

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[29]Control variables include profitability, asset tangibility, lagged sales growth, and firm size. For interest rate regressions, leverage is added as an additional control variable. Investment regressions additionally include cash to asset as a control variable. Standard errors are clustered at the industry level.

suggesting that including these firms attenuates the reform's effects, consistent with the intuition that firms affiliated with business groups are less sensitive to changes in bankruptcy proceedings regardless of their individual level of interest coverage.

To ensure that the results are not affected by unobservable firm characteristics, I examine changes in firms' leverage, cost of credit, and investment around the reform within the same firm. Figure 6 plots the time-series evolution of different firm characteristics for firms in the riskiest and safest quintiles from 2001 to 2005. The plots show that firms sorted into the riskiest and safest quintiles show no significant changes in their cash to assets ratio, leverage, interest rates, investment to assets ratio, or assets tangibility ratio during the 2001–2005 period. While total assets of the average risky and safe firms are somewhat more volatile they show no clear trends. This evidence suggests that firms sorted in the same risk quintile in 2001 and 2005 do not differ in terms of observable characteristics, which in turn suggests that mean-reversion and survivorship bias do not differ for firms sorted in 2001 and 2005 due to differences in observable firm characteristics.

Figure 7 plots the time series evolution of risky and safe firms' debt to assets ratios (top Panel), cost of credit (middle Panel), and investment to assets ratios (bottom Panel) from 2005–2008. The change from one year to the next is the growth rate in the respective year minus the growth rate for 2001 sorted firms. For example the adjusted debt to assets ratio in 2006 equals: $DebtA_{2005} + [(DebtA_{2006} - DebtA_{2005}) - (DebtA_{2002} - DebtA_{2001})] = DebtA_{2006} - (DebtA_{2002} - DebtA_{2001})$. Risky firms' leverage, cost of credit, and investment to assets ratio show the same relative increase as in Figures 3 to 5. Importantly, all three plots show the same patterns as the plots in Panel A of Figures 3 to 5. This provides strong evidence that the increase in leverage, interest rates, and investment for risky relative to safe firms after the reform is not driven by differences in unobservable firm characteristics.

Table 5 complements the graphical analysis in Figure 7. The parameter $DR_i * event_t * reform_{it}$ is equivalent to the difference in the estimates of $DR_i * event_t$ for the 2005–2008 period compared with the 2001–2004 period. For example, the coefficient in column I shows that the debt to asset ratio increased by 1.01 pp more per default risk quintile after the UBA, relative to the increase in leverage per risk quintile after 2001. The cost of credit increases by 47 bp more per default risk quintile (column II), and the investment to assets ratio increases by 1.11 pp more per default risk quintile (column III). Columns IV–VI show the results after adding firm fixed effects to track changes *within the same firm*. Adding firm fixed effects leaves the results qualitatively unaffected. Columns VII–IX control for survivorship bias by

sorting firms at the end of the sample period in 2010 instead of sorting firms at the beginning of the sample period in 2001. The results are qualitatively identical and quantitatively similar to the corresponding results in columns IV–VI. To facilitate comparison, columns X–XII replicate the main tests from Table 3 for the 2005–2008 period. The estimates are similar in magnitude compared to the estimates in columns IV–IX, further strengthening the evidence that the estimates in Table 3 are not biased due to differences in unobservable firm characteristics. If anything, the results from the basic estimation strategy in equation (1) are lower than the within-firm estimates.

An alternative way to abstract from endogenous risk-sorting at the firm-level is to sort firms according to the riskiness of the industry that they operate in (average interest coverage). The results from industry-sorting are collected in Table 6. After the enactment of the UBA, firms in riskier industries increase leverage by 0.23 pp per risk quintile more (column I). Interest rates relatively increase for firms in risky industries, by 39 bp per risk quintile after the reform (column II). Similarly, investment to assets increases significantly more for firms in risky industries, by 0.21 pp per risk quintile under the management stay system (column III). The magnitude of the reform's effect is lower with industry-sorting compared to firm-level sorting, as even the riskiest industries include safe firms and vice versa. Overall, the results in Table 6 confirm that the reform effects are not driven by endogenous firm-level sorting into risk-quintiles around the reform.

6.2   Personal Bankruptcy Costs Channel

The reform's effects may be driven by different channels including the retention of incumbent management's firm-specific human capital, a better balance between liquidation and reorganization, or lower direct bankruptcy costs under management stay, all of which may reduce overall bankruptcy costs, increasing firms willingness to implement financing and investment policies that imply a higher risk of bankruptcy. Additionally, managers' and (controlling) shareholders' personal bankruptcy costs are lower under the management stay system where job loss and ownership transfer are less likely. This section explores changes in managers' and controlling shareholders' personal bankruptcy costs as one potential channel explaining the increase in leverage and investment under the management stay system.

To examine whether managers' and controlling shareholders' personal bankruptcy costs have a significant effect on firms' financing and investment decisions, I exploit cross-sectional

variation in the UBA's effect on managers and controlling shareholders in different firms. Heterogeneity in ownership provides variation in the effect of the UBA on controlling shareholders' bankruptcy costs. Ownership transfer is particularly costly for shareholders who are controlling shareholders and enjoy private benefits of control (Anderson, Mansi, and Reeb 2003; Paligrova 2010; Faccio, Machica, and Mura 2011; Lins, Volpin, and Wagner 2013). Thus, if controlling shareholders' personal bankruptcy costs have a significant impact on firms' financing and investment decisions, the effect of the UBA should be stronger for firms with concentrated ownership. Consistent with this conjecture, sorting firms into quintiles according to their level of ownership concentration in the year before the reform, I find that the relative increase in risky firms' leverage and investment after the reform is significantly stronger for firms with higher ownership concentration, measured as the Herfindahl index of ownership concentration (Table 7, columns I and III).

Managers are more sensitive to forced resignation in bankruptcy states under the receivership system, if their wealth is more concentrated in the firm. One factor contributing to higher wealth concentration is inside ownership.[30] Sorting firms into quintiles according to CEOs' ownership share in the year before the reform, I find that firms in which CEOs hold a higher fraction of the firms' stocks increase leverage and investment more after the reform when managers are less likely to resign in bankruptcy states (Table 7, columns IV and VI). Additionally, for young managers, who face a longer career horizon, expected future wealth is more dependent on their ability to survive bankruptcy proceedings in the firm. I find that the increase in leverage and investment is significantly higher for firms run by younger managers (columns VII and IX, where age_i sorts firms into quintiles according to CEO age in the year before the bankruptcy reform, taking the value of five for the youngest and one for the oldest quintile of CEOs.). Taken together, the results in Table 7 suggest that managers' and controlling shareholders' personal bankruptcy costs are an important driver of lower risk-taking under the receivership system.

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[30]Theoretically, the prediction of CEO ownership is not unambiguous. On the one hand high CEO shareholdings increase the concentration of the CEO's wealth in the firm. On the other hand, any investment distortions that reduce firm value are more costly for CEOs who own a larger fraction of the firm's shares. Empirically, Friend and Lang (1988) and Gormley and Matsa (2016) show that the risk-aversion motive dominates.

6.3 Other Channels

This subsection discusses additional channels that may contribute to lower risk-taking under the receivership system. First, managers may possess firm-specific human capital that is lost under the receivership system, but retained the under management stay system. In this case, firms may reduce risk-taking under the receivership system to lower the risk of losing the incumbent manager's firm-specific human capital. However, this is not consistent with several observations. The receiver or new investor could re-appoint the manager at any time. However, this is not the case in any of the pre-reform restructuring cases in which an external receiver is appointed. Additionally, in virtually all cases the manager does not return to the firm after it is sold to new investors. Even in out-of-court restructuring, creditors demand the replacement of incumbent management and ownership transfer in most cases.

Second, while direct bankruptcy costs are higher under the management stay system, a better balance between liquidation and reorganization may reduce overall bankruptcy costs, increasing firms' willingness to implement financing and investment policies that imply a higher risk of default. However, under the receivership system, the new owners of the firm may decide to continue the firm, or liquidate (parts of) the firm, whatever they deem optimal. Thus, it seems unlikely that the management stay system strikes a better balance between liquidation and reorganization leading to higher risk-taking.

Third, a limited number of potential bidders under the sales procedure in the pre-reform receivership system may lead to low proceeds for existing shareholders and creditors under the receivership system (Meier and Servaes 2017). At least for creditors this should be less of a concern, as they are able to participate in the sales process and take over the firm, if other bids are too low (which occationally occurs). Thus, creditors should be able to recover the maximum of the continuation and the liquidation value of the firm, which is the upper bound of what they can expect under the management stay system, which is also consistent with lower costs of credit under the receivership system.

Fourth, the management stay system may increase payments to shareholders at the expense of creditors. Annecdotal evidence, as well as empirical evidence from management stay systems in other countries, is consistent with shareholders being able to extract higher concessions under a management stay system (Franks and Torous 1989; Eberhart, Moore, and Roenfeldt 1990; Weiss 1990), compared to a receivership system under which shareholders are residual claimants. This may make firms more willing to take on additional

debt, if they expect higher shareholder recovery in bankruptcy. To the extent that ex post differences in the allocation of cash flows is reflected in the ex ante pricing of credit, diversified, risk-neutral shareholders should be indifferent about shifting cash flows between states. However, concentrated, risk-averse shareholders may prefer to shift higher cash flows to default states leading to an increase in the demand for credit. This effect is complementary to lowering controlling concentrated shareholders personal bankruptcy costs by increasing their cash flows in default states.

6.4   Credit Supply

The increase in leverage for risky firms after the reform, in combination with the increase in the cost of credit, suggests that the dominating effect of the UBA is an increase in the demand for credit. However, the shift from the receivership to the management stay system may also have implications for credit supply. To explore supply effects, I exploit cross-sectional differences in creditors' sensitivity to changes in bankruptcy proceedings through the UBA. The loss of control in reorganization proceedings under the management stay system is more detrimental for creditors whose claims are not well protected in bankruptcy. One factor that protect creditor claims in bankruptcy is a higher liquidation value of the firm's assets, for example collateral from tangible assets (Barro 1976; Stiglitz and Weiss 1981; Hart and Moore 1994, 1998; Lacker 2001; Jimenez, Salas, and Saurina 2006; also see Proposition 4 is Section 3). Thus, creditors should become less willing to provide financing to firms with lower asset tangibility after the reform, if the management stay system makes it harder for creditors to recover their claims. In this case, the increase in leverage should be *higher* for firms with a high fraction of tangible assets, and their interest expenses increase relatively less. In contrast, a pure demand effect provides no differential prediction for changes in interest rates for firms with different degrees of asset tangibility.

In Table 8, columns I–III, I sort firms according to their asset tangibility ratio in the year before the enactment of the UBA. I find that interest rates increase *less* for risky firms with a higher fraction of tangible assets (column II). This is consistent with creditors demanding higher compensation for the loss of control in bankruptcy proceedings for firms in which liquidation values are lower. Facing a lower increase in financing costs, risky firms with a higher fraction of tangible assets increase leverage slightly more after the reform (column I), and increase investment more (column III). These results suggest that the while the introduction of management stay had a positive effect on the demand for credit, the

effect on the supply of credit is negative, with the demand effect dominating the supply effect in equilibrium.

6.5 Efficiency of Additional Investment

The previous results show that the introduction of management stay and the associated increase in managers' and controlling shareholders' personal bankruptcy costs lead to higher risk-taking and more investment. Whether the documented increase in leverage and investment constitutes an improvement depends on the efficiency of the additional investment. The receivership system may have prevented firms from engaging in overinvestment and risk-shifting (Jensen 1986; Harris and Raviv 1990; Skeel 1993; Zwiebel 1996) by increasing managers' and controlling shareholders' personal bankruptcy costs. Alternatively, high personal bankruptcy costs may have led to underinvestment in positive NPV projects that involve risk (Donaldson 1969; Amihud and Lev 1981; Rasmussen 1994).

From the outset, it is important to emphasize that it is challenging to evaluate the efficiency of corporate investment. To provide some suggestive evidence on whether the introduction of management stay improves or distorts investment decisions relative to the receivership system, I combine two separate pieces of evidence. First, I examine whether the increase in investment can be attributed to firms with good investment opportunities. Second, I examine changes in firms' profits, to assess whether the additional investment goes to positive NPV projects. Finally, I explore changes in firms' cash flow volatility to provide additional evidence on changes in firms' willingness to take risk after the reform.

In Table 8, columns IV–VI, I sort firms into quintiles according to their level of investment opportunities before the enactment of the UBA. Since the sample includes mostly private firms, I use lagged sales growth as a proxy for investment opportunities, as is standard in the literature (Lehn and Poulsen 1989; Shin and Stulz 1998; Badertscher, Shroff, and White 2013). I find that risky firms with good investment opportunities experience a higher increase in their debt to assets ratio than firms that lack good investment opportunities (column IV), and use a large fraction of the additional credit for investment (column VI). Significantly higher investment by firms with good investment opportunities provides initial evidence that the introduction of management stay encourages more investment in good investment projects, rather than overinvestment in unprofitable projects.

In Table 9, I examine changes in firms' profits around the implementation of the UBA. Growth in profits is defined as the one year change in the level of net income scaled by firm assets at the beginning of the year. I examine the growth rate of the *level* of profits as it is not clear how additional investment affects profitability (ROA). Firms may only invest in the most profitable projects before the reform and abstain from lower (but still positive) NPV projects, because they are reluctant to take on more leverage for financing these projects. Hence, even if the additional investment goes to positive NPV projects after the reform, average profitability may decline. I find that profits grow relatively more for risky firms under the management stay system than for safer firms, by 0.14 percent of firms' assets per default risk quintile (column I). The effect remains highly significant after controlling for industry fixed effects and firm-level controls (column II), and industry-year fixed effects (column III) with 0.27 percent per risk quintile. Consistent with the previous results, profits increase particularly for those risky firms that increase investment more. Profits increase more for risky firms with concentrated ownership (column IV), risky firms with high CEO shareholdings (column V), risky firms with younger CEOs (column VI), and risky firms with good investment opportunities (column VIII). These results suggest that the additional investment goes to positive NPV projects, leading to higher profits for risky firms that increase investment.

Finally, Table 10 depicts information on changes in cash flow volatility around the UBA. For each firm, I estimate cash flow volatility separately for the pre-reform period and the post-reform period, and regress cash flow volatility on firms' average default risk measure for the respective period. Risky firms' cash flow volatility increases significantly more after the reform (column I). The increase in cash flow volatility for risky firms relative to safe firms is even higher after controlling for industry-fixed effects and firm controls (column II), and industry-event fixed effects (column III). The increase in cash flow volatility is higher for risky firms with concentrated ownership (column IV), risky firms with higher CEO shareholdings (column V), risky firms with younger CEOs (column VI), and risky firms with better investment opportunities (column VIII).These results strengthen the view that firms are willing to take on more risk under the management stay system when managers' and controlling shareholders' personal bankruptcy costs are lower.

6.6   Effects on Innovation

A significant fraction of innovation is undertaken by risky firms. Thus, the design of bankruptcy proceedings is highly relevant for innovative firms.[31] To examine the effect of the UBA on innovation, I examine changes in innovation input and output after the enactment of the reform. In columns I–III in Table 11, I study changes in firms' R&D expenses to assets ratio. I find that after the reform, risky firms increase investment in R&D more than safe firms, by 0.10 pp per default risk quintile (column I). The effect is similar when adding industry fixed effects and firm controls (column II), with 0.12 pp per risk quintile, and industry-year fixed effects (column III) with 0.13 pp per risk quintile. In columns IV–VII, I examine changes in innovation output. For the subsample of firms that successfully apply for at least one patent during the sample period, I examine changes in the number of successful patent applications after the enactment of the UBA. To control for differences in firm size, I scale the number of patents by firms' book value of assets (in billon Korean won). Risky firms apply for slightly more patents after the reform, with 0.0052 patents per billion won in assets per default risk quintile (column IV). After controlling for industry-fixed effects and firm characteristics, the difference is 0.0042 patents per billion won of assets (column V). Controlling for industry-year fixed effects, the effect is similar, with 0.0036 patents per billion won of assets per default risk quintile (column VI). In column VII, I examine the full sample of firms, including firms that never successfully apply for a patent during the sample period. Risky firms apply for more patents after the reform with 0.0015 patents per billion won of firm assets per risk quintile in the full sample. Together, these results suggest that firms engage in more innovation under the management stay system when managers' and controlling shareholders' personal bankruptcy costs are lower.

7   Discussion and Robustness Tests

This section discusses alternative contracting solutions to mitigate underinvestment in risky projects under the receivership system, and discusses the potential influence of the financial crisis period for the results in the paper.

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[31]Manso (2011) shows theoretically that making failure less costly for managers may encourage innovation.

7.1 Alternative Sources of Financing

One obvious alternative to financing investment with risky debt is equity. However, while issuing equity does not increase the risk of default directly, investment in risky projects still increases the risk of entering financial distress, making firms unwilling to finance highly risky projects even with equity. Moreover, equity investment might be prohibitively costly for some projects in the presence of information asymmetries (Myers and Majluf 1984). In the context of Korean firms, where ownership and control are often not separated and private benefits of control are large, existing owners might be unwilling to share control rights with new investors. This may prevent financing with common equity making equity financing more costly. Similarly, new shareholders might demand compensation for becoming minority shareholders in a firm with rent-extracting controlling shareholders that exceeds the gains from additional investment. Finally, a large fraction of the firms in the sample are private firms with limited access to equity markets.

Alternatively, firms could finance new investment by selling assets. This requires that asset sales are not prohibited by debt contracts, which would lower the firm's ability to obtain secured financing. Additionally, firms are constrained to selling assets that are not vital to their operations. Thus, while in some cases financing new investment with asset sales might be feasible, firms face constraints in their ability to liquidate assets for new investment.

If investment projects are profitable, firms might be able to receive additional debt financing. Information asymmetry, in combination with covenants that prevent issuing new debt with equal priority is likely to make financing from new creditors costly, which may exceed the benefits from additional investment. Additionally, given the high level of control and the option to acquire the firms' shares in pre-reform reorganization proceedings, existing creditors may prefer for the firm to default precisely when it is profitable. A residual claim on the firm might yield higher returns than their fixed claim (Rasmussen 1994).

Taken together, while some alternative forms of financing might be available under the receivership system, in many cases alternative sources of financing might be prohibitively costly, or do not overcome the fundamental problem that firms hesitate to invest in risky projects regardless of the source of funding.

7.2 Alternative Contracting Solutions

An alternative way to salvage debt financing is using private workouts. Shareholders can negotiate with creditors outside the court-supervised reorganization procedure, to avoid mandatory management resignation and ownership transfer. One problem with private workouts is that they suffer from free-rider problems. Creditors who refuse to participate in the workout benefit from other creditors' willingness to forgive part of their claims (Roe 1987). While the Korean system provides a work-out procedure that attempts to overcome the free-rider problem by making agreements that are accepted by three-quarters of all and three-quarters of secured creditors binding for all creditors in large firms, this procedure is rarely used, with only a handful of cases per year during the sample period. The main impediment to creditors agreeing to out-of-court restructuring before the reform is their high level of control in in-court proceedings, combined with their legal power to force firms into in-court proceedings. Thus, while it may be ex ante optimal to allow managers and controlling shareholders to stay in control of the firm during bankruptcy proceedings, creditors may ex post prefer to get rid of incumbent management and existing owners.[32]

Another possibility for firms to mitigate managers' lower willingness to take risks under the receivership system is to alter the design of their compensation contracts. However, there are constraints to legally feasible contracts. The Korean system does not allow for contracts that assign a higher priority to payments to managers above other employees and creditors. One possibility to provide managers with payments with high priority in default states is to make them secured creditors. The downside of this contractual arrangement is that it reduces the amount of secured debt that firms can issue in the market. Additionally, transfers to managers are constrained by the funds available to the firm in default states, which might be lower than what is required to compensate managers for the loss of future labor income and private benefits.

7.3 Financial Crisis Period

An important concern is whether the financial crisis period starting in 2008 could have an effect on the results documented in the paper by affecting risky and safe firms differentially. The main concern relates to the increase in the costs of credit for risky relative to save

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[32]Consistent with the low incentive for creditors to compromise in out-of-court workouts before the reform, managers lose control in the majority of cases under the receivership system.

firms. For other results in the paper, for example higher investment by risky firms after 2005, effects of the financial crisis points in the opposite direction. Two pieces of evidence suggest that the results on interest rates are not driven by the financial crisis period. First, interest rates start to increase in 2006, the year when the UBA was implemented, rather than coinciding with the crisis period in 2008 (Figure 4.). Second, interest rates of risky firms remain at a higher level even after the sample period in 2010 (Figure 8.). This suggests that the effects are not specific to the crisis period, but a persistent feature under the new bankruptcy regime.

8   Conclusion

A large literature debates the optimal design of bankruptcy proceedings, which is part of the policy agenda in many countries and international organizations in recent years. An important aspect of bankruptcy law design is how it affects firms' financing and investment decisions ex ante. This paper documents that forcing incumbent managers and shareholders to exit during bankruptcy proceedings reduces firms' willingness to take risk, leading to lower demand for credit and lower investment, in particular in risky projects.

In 2006 Korea implemented a bankruptcy reform that introduced a management stay system similar to Chapter 11 in the U.S., replacing a receivership system under which incumbent management was forced to resign, and the firm was sold to new investors. Following the reform, when managers are allowed to stay in control of the firm during bankruptcy proceedings, risky firms, which are most sensitive to the design of bankruptcy law, increase leverage, investment, and innovation. The additional investment is undertaken by firms with good investment opportunities and appears to flow to positive NPV projects. Consistent with an increase in firms' willingness to take on more risk, risky firms' cash flow volatility significantly increases after the reform relative to safer firms.

Managers' and controlling shareholders' personal bankruptcy costs seem to be an important channel explaining lower corporate risk-taking under the receivership system. Firms in which private benefits of control are high and in which managers face higher personal bankruptcy costs under the receivership system operate particularly conservative under the receivership system. Specifically, firms with large controlling shareholders, firms in which CEOs own a high fraction of the firm's shares, and firms with young CEOs with a longer

career horizon take on less leverage and investment less under the receivership system.

An important question is whether the results in the paper are relevant beyond the Korean context. Nenova (2003) and Dyck and Zingales (2004) estimate that private benefits of control are large in Korea. In addition to the high value of private benefits, concentrated ownership is pervasive. It thus seems plausible that the results apply to countries with similarly high levels of family and concentrated ownership where private benefits of control are large. Family control is the typical ownership structure in emerging economies, but is also widespread in developed countries (La Porta, Lopez-de Silanes, and Shleifer 1999; Claessens, Djankov, and Lang 2000; Faccio and Lang 2002). When looking beyond the very largest firms, concentrated ownership is also common in the U.S. (Anderson and Reeb 2003; Villalonga and Amit 2006; Holderness 2009). Thus, private benefits of control are an important consideration in a large fraction of firms around the world, suggesting that the documented results are relevant beyond the institutional context examined in this paper.

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Figure 1: **Cashflows**

t=0   t=1   t=2   t=3

$$\theta \nearrow C^H$$

$$- I \qquad \gamma \nearrow C^H \qquad C_3$$

$$1-\theta \searrow C^L \qquad 1-\gamma \searrow C^L$$
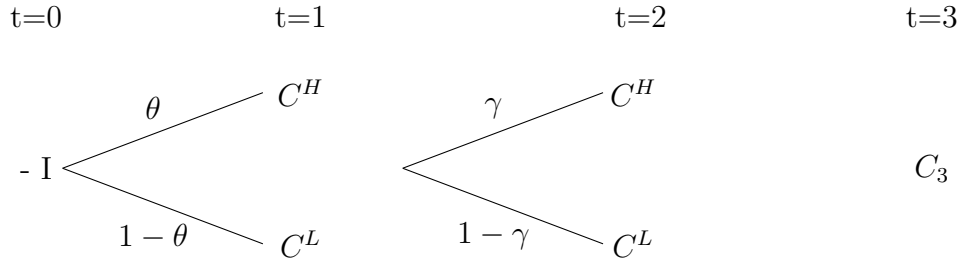
This figure shows the cashflows that occur in each period of the model.

Figure 2: **Investment Regions**
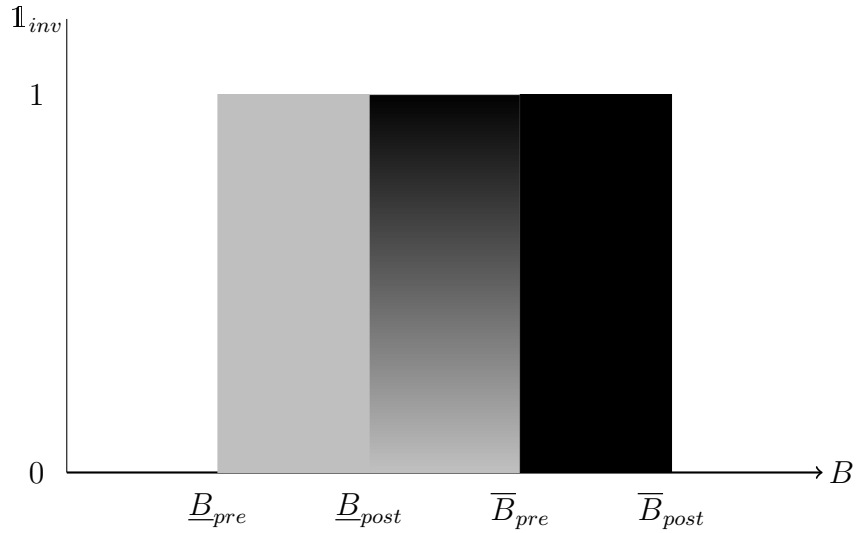
This figure illustrates the effect of the reform on firms' investment decision (y-axis) depending on the entrepreneur's private benefit (x-axis). Under the post-reform regime (black), the investment region is shifted rightward between $\underline{B}_{post}$ and $\overline{B}_{post}$, compared with the pre-reform regime investment region (gray) between $\underline{B}_{pre}$ and $\overline{B}_{pre}$.

Figure 3: **Leverage**
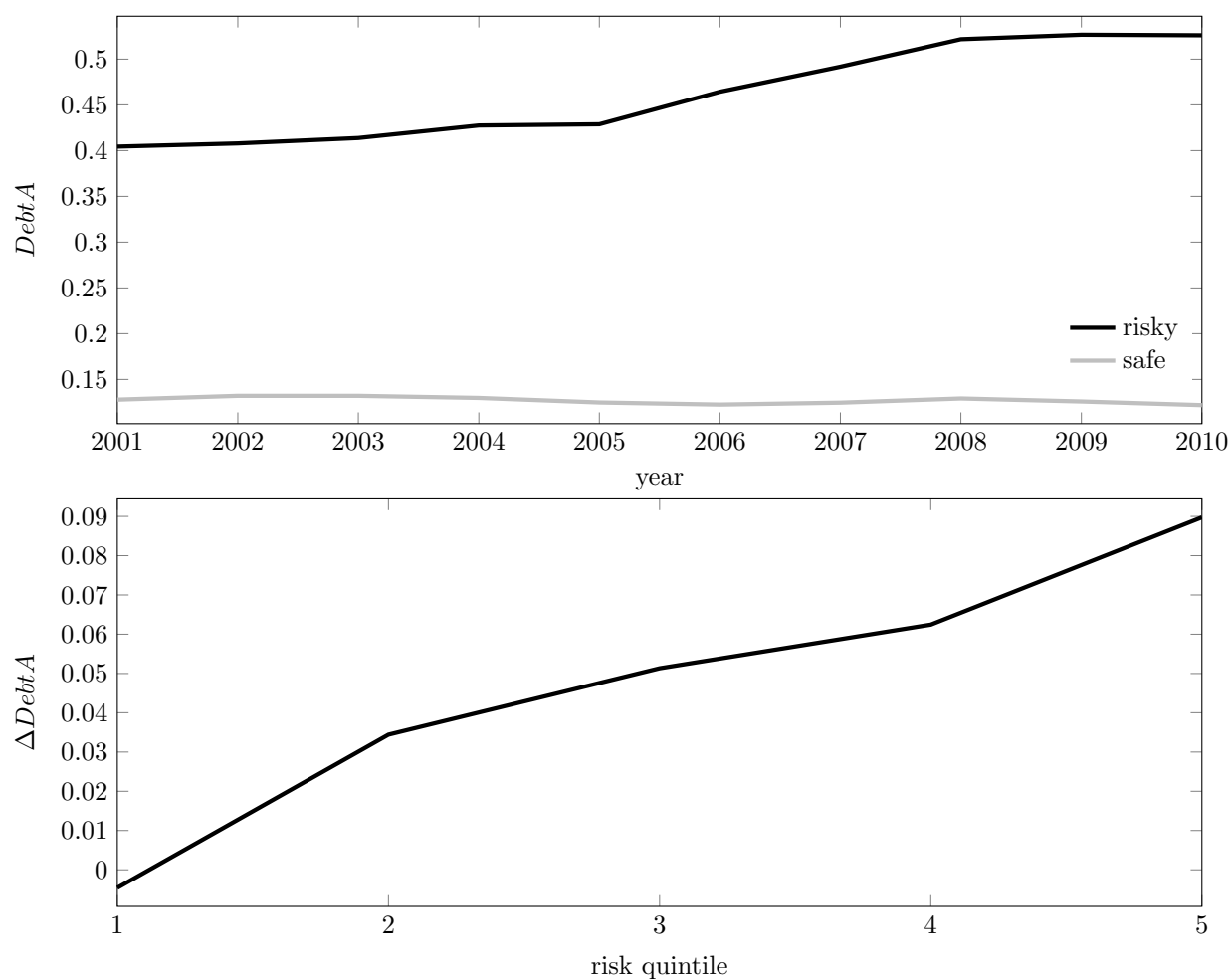
The top panel of this figure plots the time series evolution of firms' debt to assets ratio around the enactment of the UBA in 2006 for the riskiest (black line) and the safest (gray line) quintile of firms. The bottom panel plots the average change in the debt to assets ratio between the post- and pre-reform periods for firms in different default risk quintiles, from one for the safest up to five for the riskiest firms.

Figure 4: **Cost of Credit**
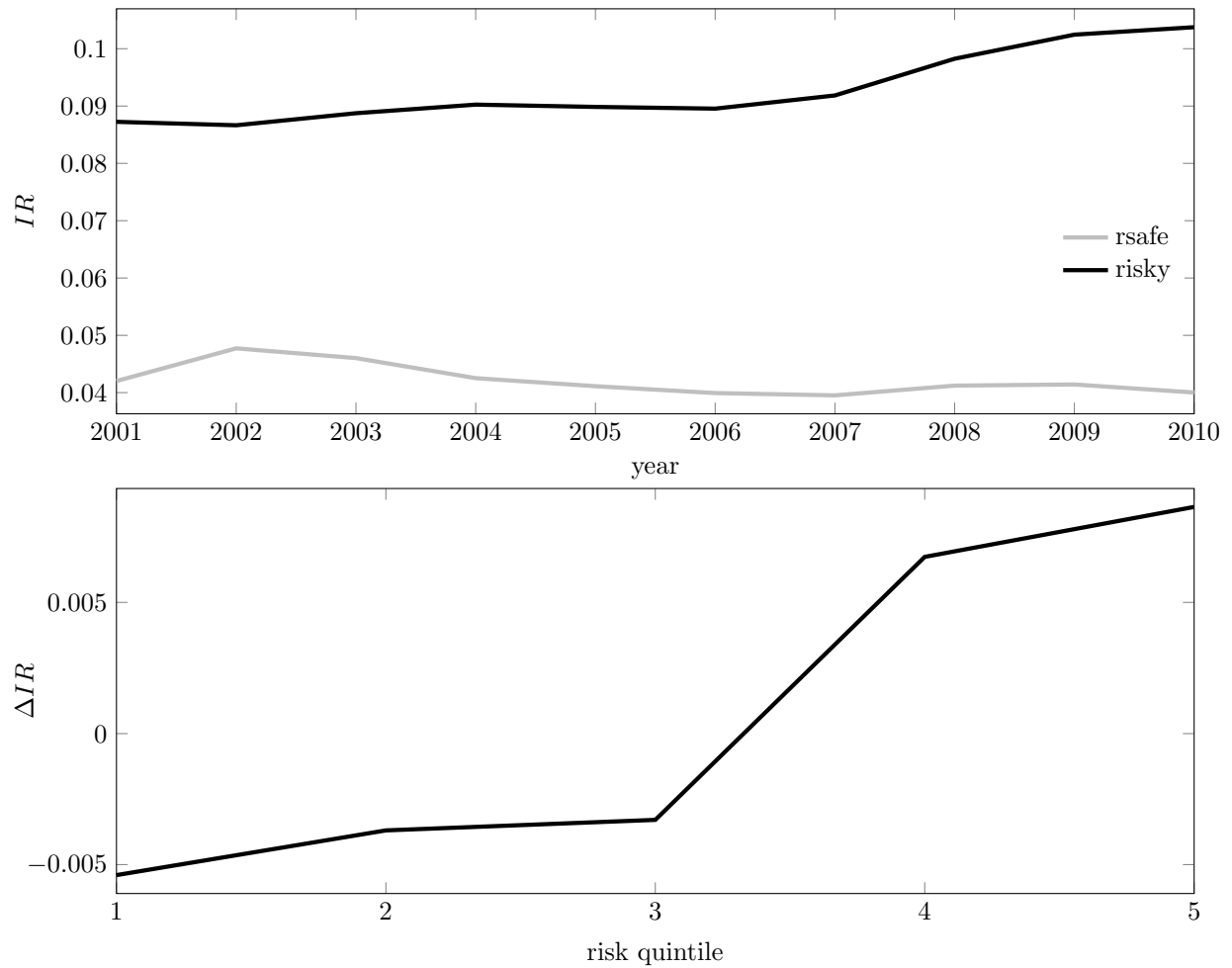
The top panel of this figure plots the time series evolution of firms' interest expenses to total debt ratio around the enactment of the UBA in 2006 for the riskiest (black line) and the safest (gray line) quintile of firms. The bottom panel plots the average change in the interest expenses to debt ratio between the post- and pre-reform periods for firms in different default risk quintiles, from one for the safest up to five for the riskiest firms.

Figure 5: **Investment**
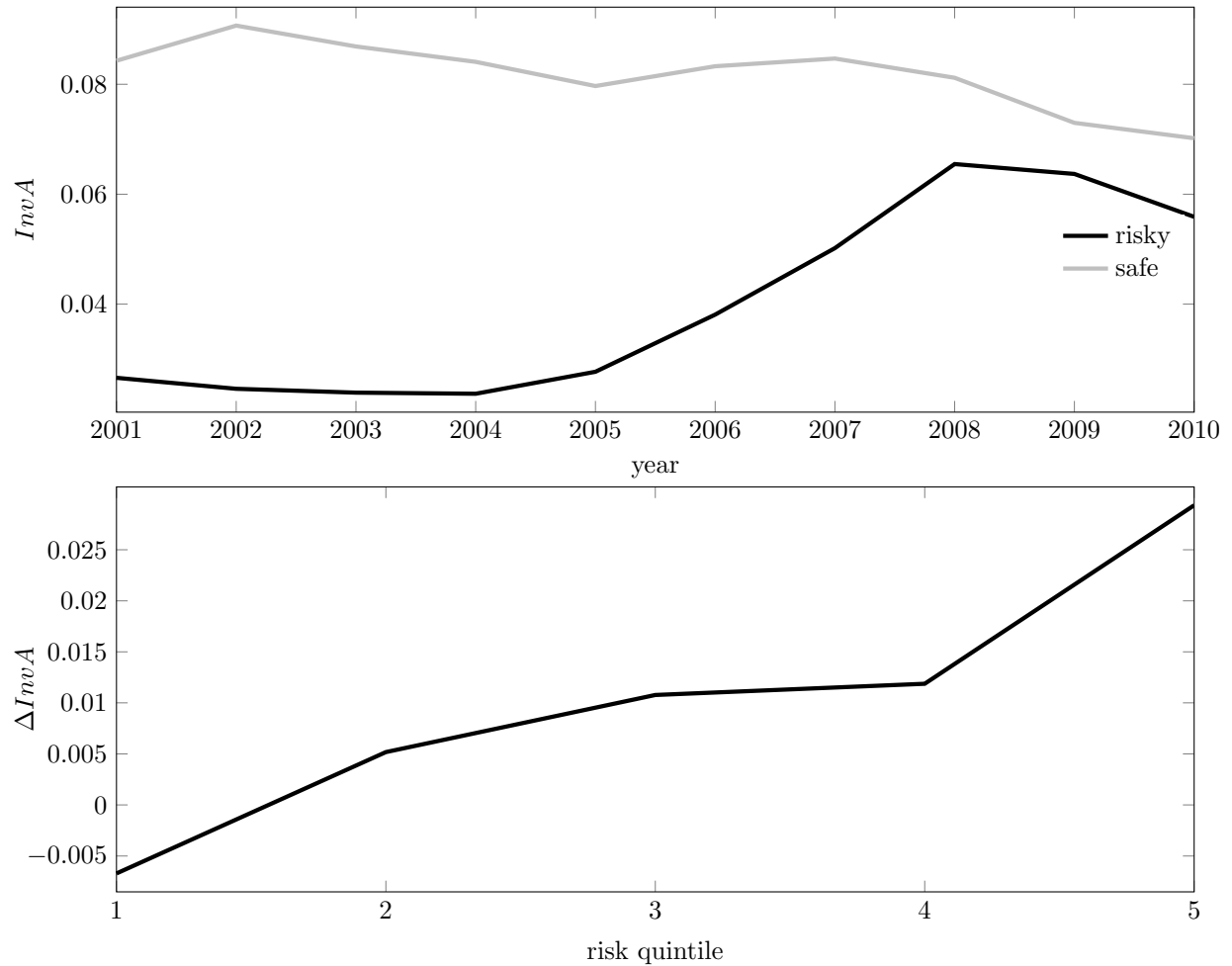
The top panel of this figure plots the time series evolution of firms' investment to assets ratio around the enactment of the UBA in 2006 for the riskiest (black line) and the safest (gray line) quintile of firms. The bottom panel plots the average change in the investment to assets ratio between the post- and pre-reform periods for firms in different default risk quintiles, from one for the safest up to five for the riskiest firms.

Figure 6: **Pre-reform Trends**

This figure plots the time series evolution of different firm characteristics (total assets (in bn Korean won), cash to assets, debt to assets, interest expenses to total debt, investment to asset, and the share of tangible assets to total assets) for the riskiest (black lines) and safest (gray lines) quintiles of firms before the enactment of the UBA.

Figure 7: **Within-Firm Changes**
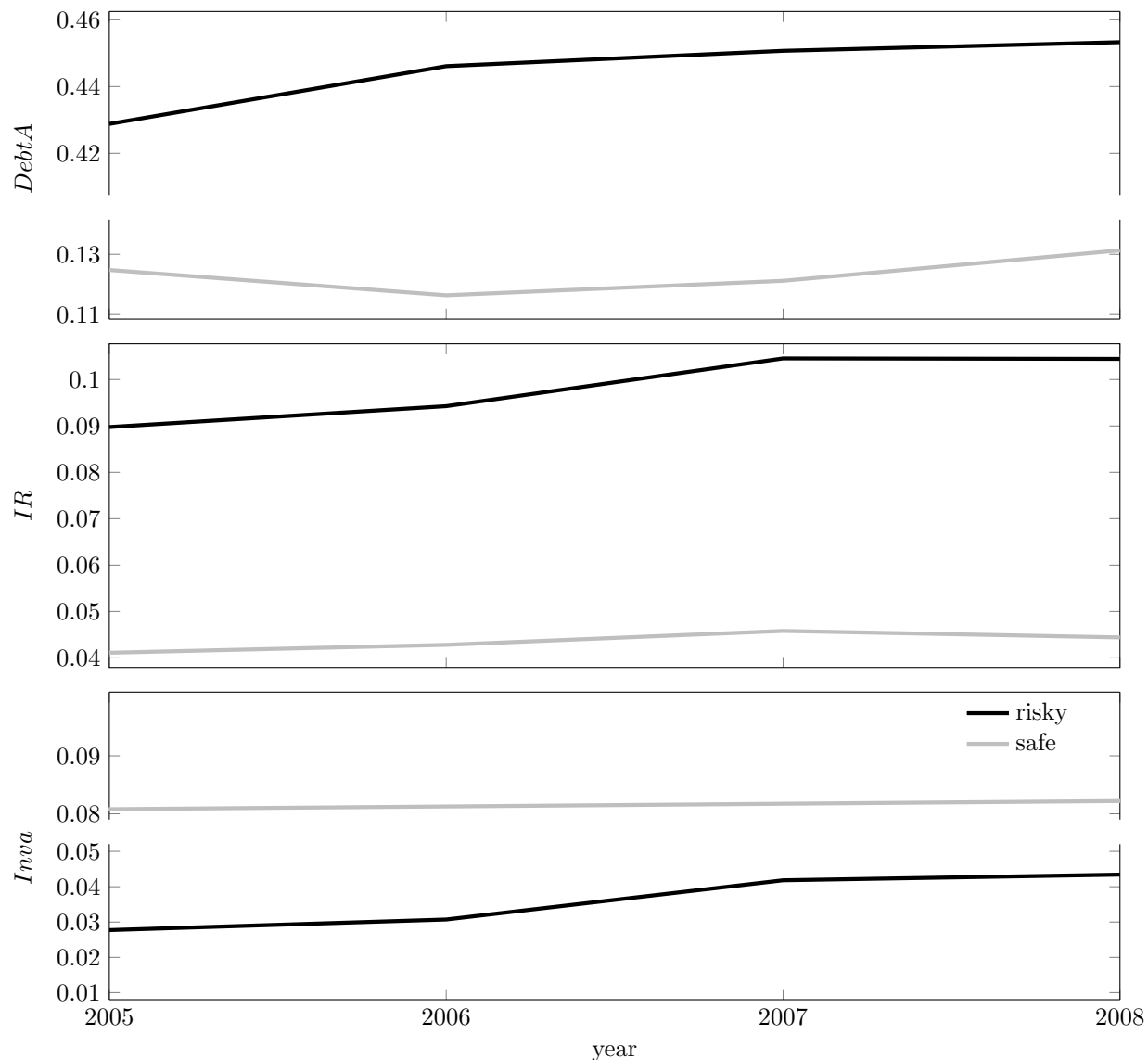
The top panel of this figure plots firms' average debt to assets ratio around the enactment of the UBA in 2006 for the riskiest (black line) and the safest (gray line) quintile of firms. The middle panel plots firms' average interest expenses to debt ratio, and the bottom panel plots firms' average investment to assets ratio. Firms are sorted into default risk quintiles in 2005. The changes in firm characteristics are adjusted for changes for firms sorted into default risk quintiles in 2001. For example, the debt to assets ratio in 2006 is the debt to asset ratio in 2005, plus the debt to assets growth rate in 2006, minus the debt to assets growth rate in 2002, for firms sorted into the respective default risk quintile in 2001.
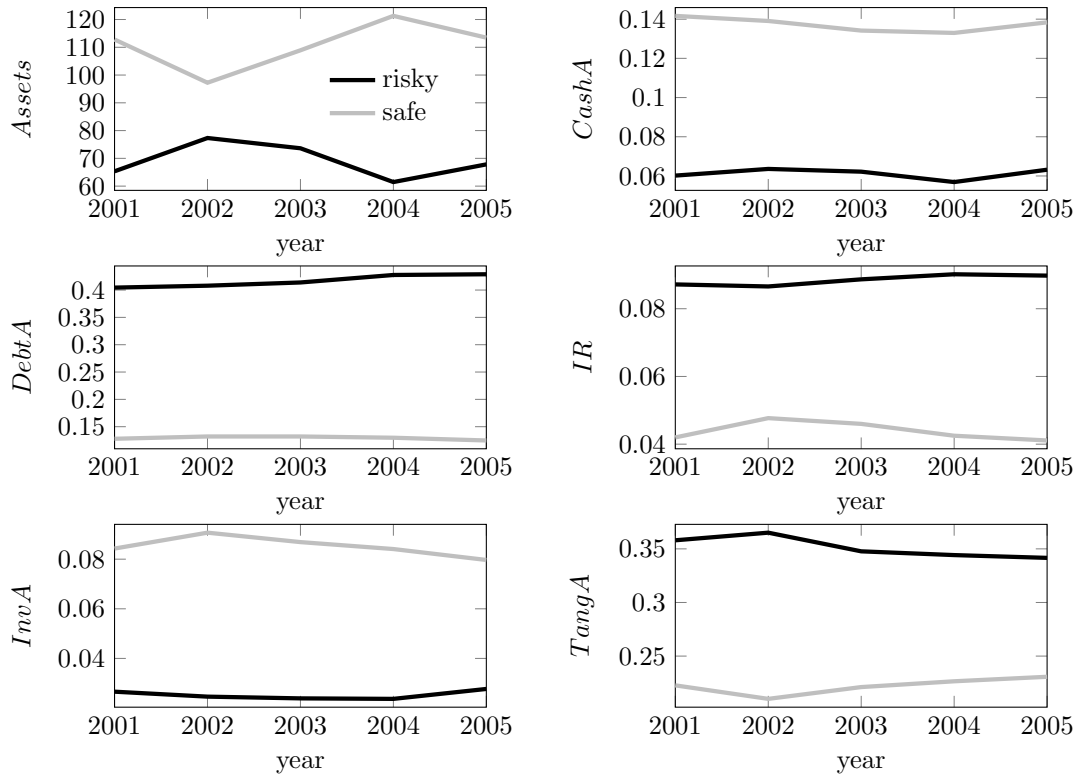
45

Figure 8: **Cost of Credit - Post-Sample Trend**
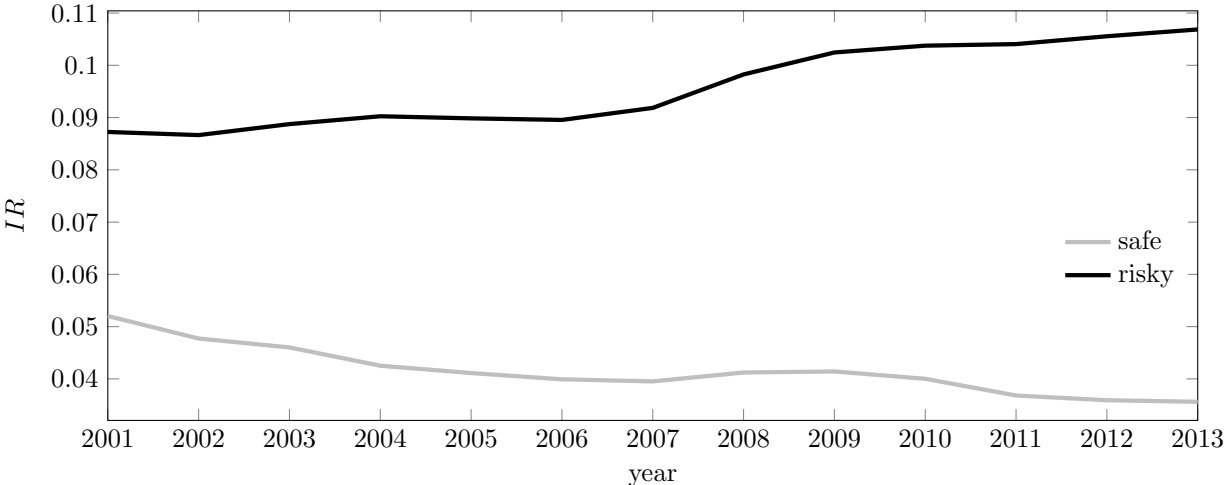
The top panel of this figure plots the time series evolution of firms' interest expenses to total debt ratio from 2001 to 2013 for the riskiest (black line) and the safest (gray line) quintile of firms.

Table 1: Bankruptcy Filings and Workouts

Panel A: Bankruptcy Filings (Sample Firms)	I All filings	II Composition	III Reorganization	IV Rehabilitation
Number filings	421	25	42	354
Share liquidation (%)	36.34	60.00	26.19	35.88
Duration (months)	41.98	56.56	34.12	41.88
CEO stay (%)	79.81	88.00	4.76	88.14
Ownership transfer (%)	30.71	25.00	90.91	19.09

Panel B: Bankruptcy Filings Year	I Composition	II Reorganization	III Rehabilitation	IV Liquidation
2001	51	31		170
2002	29	28		108
2003	48	38		303
2004	81	35		162
2005	35	22		129
2006			117	132
2007			215	132
2008			582	191
2009			1192	226
2010			1227	253

Panel C: Workouts Year	I Total Cases	II Successful	III Failed	IV Failure Rate
2004-Q4	360	144	216	0.6000
2005	581	322	259	0.4458
2006	1491	1161	330	0.2213
2007	1353	1010	343	0.2535
2008	1219	771	448	0.3675

Panel A of this table displays outcomes for all corporate reorganization cases of sample firms, including composition, reorganization, and rehabiliation cases. The information includes the number of filings, the share of cases ending in liquidation, the duration of the proceedings, the probability of the CEO to stay in control of the firm through the proceedings, and the fraction of cases in which ownership transfer occurs. Panel B lists the number of composition and reorganization filings from 2001 to 2005, rehabilitation filings from 2006 to 2010, and liquidation filings from 2001 to 2010. Panel C lists data on workouts. For every year from 2004–2008, the panel depicts the number of workouts cases (column I), either successfully resolved (column II), or resulting in bankruptcy or liquidation (column III), for all firms with debt below 50 billion won that initiate a workout proceeding.

Panel A: Accounting data		obs	mean	median	std
Total assets (in million KRW)	full sample	183,889	78,977	12,374	907,501
	low risk	36,781	173,466	13,457	1,883,279
	high risk	36,773	65,275	14,473	543,166
Debt to assets	full sample	183,856	0.3448	0.3077	0.2834
	low risk	36,770	0.1254	0.0635	0.1635
	high risk	36,758	0.4824	0.4136	0.3820
Interest rates	full sample	176,716	0.0665	0.0465	0.01086
	low risk	32,913	0.0416	0.0214	0.0973
	high risk	35,022	0.0969	0.0577	0.1554
Cash to assets	full sample	183,377	0.0728	0.0283	0.1146
	low risk	36,699	0.1322	0.0772	0.1514
	high risk	36,623	0.0588	0.0152	0.1148
Investment to assets	full sample	181,275	0.0651	0.0007	0.2183
	low risk	36,592	0.0797	0.0053	0.2240
	high risk	35,350	0.0435	-0.0009	0.2289
Panel B: Patent data		obs	mean	median	std
Number of patents	full sample	25,812	11.04	2.00	143.42
	low risk	6,514	26.14	2.00	274.05
	high risk	3,699	9.77	2.00	85.93
Panel C: Ownership data		obs	mean	median	std
Ownership concentration	full sample	157,286	0.4243	0.3480	0.2784
	low risk	31,416	0.4332	0.3547	0.2905
	high risk	29,778	0.3978	0.3250	0.2919
CEO ownership share	full sample	157,286	0.3281	0.3000	0.2792
	low risk	31,416	0.3134	0.2809	0.2759
	high risk	29,778	0.2329	0.1738	0.2528
Panel D: CEO data		obs	mean	median	std
CEO age	full sample	122,432	51.39	51.00	9.58
	low risk	25,406	51,74	51.00	9.90
	high risk	22,383	50.53	50.00	9.56

This table provides descriptive statistics on accounting data (Panel A), patent data (Panel B), ownership data (Panel C), and CEO data (Panel D), separately for the full sample, and for firms in the lowest and highest default risk quintiles.

Table 3: Reform Effect

Dep var:	I $DebtA_{it}$	II $DebtA_{it}$	III $DebtA_{it}$	IV IR_{it}	V IR_{it}	VI IR_{it}	VII $InvA_{it}$	VIII $InvA_{it}$	IX $InvA_{it}$
DR_{it}	0.0777***	0.0655***	0.0661***	0.0114***	0.0173***	0.0177***	-0.0158***	-0.0100***	-0.0102***
	[0.0027]	[0.0016]	[0.0017]	[0.0015]	[0.0014]	[0.0015]	[0.0017]	[0.0008]	[0.0008]
$DR_{it}*event_t$	0.0249***	0.0076***	0.0084***	0.0034***	0.0031***	0.0025***	0.0087***	0.0060***	0.0067***
	[0.0052]	[0.0021]	[0.0020]	[0.0013]	[0.0011]	[0.0009]	[0.0016]	[0.0009]	[0.0010]
Observations	183,854	163,444	163,444	176,726	157,820	157,820	194,469	162,929	162,929
R-squared	0.220	0.300	0.321	0.031	0.111	0.142	0.009	0.058	0.093
Year FE	yes	yes	-	yes	yes	-	yes	yes	-
Ind FE	no	yes	-	no	yes	-	no	yes	-
Ind-Year FE	no	no	yes	no	no	yes	no	no	yes
Controls	no	yes	yes	no	yes	yes	no	yes	yes
Clustered SE	ind	ind	ind	ind	ind	ind	ind	ind	ind

This table shows the results of regressing firms' debt to asset ratio ($DebtA_{it}$), annual interest rates (IR_{it}), and investment to assets ratio ($InvA_{it}$) on a lagged default risk variable that takes the value of one for the safest quintile of firms, up to five for the riskiest quintile of firms (DR_{it}), and the interaction of the default risk variable with a dummy variable ($event_t$) that takes the value of zero for the pre-reform period from 2001–2005, and one for the post-reform period from 2006–2010. Standard errors are reported in brackets. The bottom of the table provides information on fixed effects and the clustering of standard errors. Details on control variables can be found in the text. *** denotes statistical significance at the 1% level.

Table 4: Reform Effect - Excluding Business Groups

Dep var:	I $DebtA_{it}$	II $DebtA_{it}$	III $DebtA_{it}$	IV IR_{it}	V IR_{it}	VI IR_{it}	VII $InvA_{it}$	VIII $InvA_{it}$	IX $InvA_{it}$
DR_{it}	0.0794***	0.0669***	0.0682***	0.0101***	0.0164***	0.0171***	-0.0166***	-0.0106***	-0.0108***
	[0.0027]	[0.0018]	[0.0019]	[0.0018]	[0.0015]	[0.0016]	[0.0017]	[0.0008]	[0.0009]
$DR_{it}*event_t$	0.0288***	0.0100***	0.0105***	0.0045***	0.0036***	0.0027***	0.0088***	0.0066***	0.0074***
	[0.0063]	[0.0023]	[0.0023]	[0.0015]	[0.0012]	[0.0010]	[0.0018]	[0.0010]	[0.0011]
Observations	127,519	114,509	114,509	122,990	110,918	110,918	125,752	114,188	114,188
R-squared	0.237	0.310	0.336	0.029	0.110	0.153	0.011	0.062	0.114
Year FE	yes	yes	-	yes	yes	-	yes	yes	-
Ind FE	no	yes	-	no	yes	-	no	yes	-
Ind-Year FE	no	no	yes	no	no	yes	no	no	yes
Controls	no	yes	yes	no	yes	yes	no	yes	yes
Clustered SE	ind	ind	ind	ind	ind	ind	ind	ind	ind

This table shows the results of regressing firms' debt to asset ratio ($DebtA_{it}$), annual interest rates (IR_{it}), and investment to assets ratio ($InvA_{it}$) on a lagged default risk variable that takes the value of one for the safest quintile of firms, up to five for the riskiest quintile of firms (DR_{it}), and the interaction of the default risk variable with a dummy variable ($event_t$) that takes the value of zero for the pre-reform period from 2001–2005, and one for the post-reform period from 2006–2010. The sample is restricted to standalone firms whose stocks are not owned by other firms. Standard errors are reported in brackets. The bottom of the table provides information on fixed effects and the clustering of standard errors. Details on control variables can be found in the text. *** denotes statistical significance at the 1% level.

Table 5: Reform Effect - Unobservable Firm Characteristics

Dep var:	I $DebtA_{it}$	II IR_{it}	III $InvA_{it}$	IV $DebtA_{it}$	V IR_{it}	VI $InvA_{it}$	VII $DebtA_{it}$	VIII IR_{it}	IX $InvA_{it}$	X $DebtA_{it}$	XI IR_{it}	XII $InvA_{it}$
DR_i	0.0542***	0.0139***	-0.0087***									
	[0.0023]	[0.0016]	[0.0016]									
$DR_i*event_t$	0.0024	-0.0014	-0.0017									
	[0.0024]	[0.0016]	[0.0019]									
$DR_i*reform_t$	-0.0171***	-0.0060***	0.0017	-0.0099***	-0.0046***	-0.0061***	-0.0113***	-0.0018***	-0.0066***			
	[0.0016]	[0.0011]	[0.0015]	[0.0012]	[0.0009]	[0.0015]	[0.0013]	[0.0007]	[0.0013]			
$DR_i*event_t*reform_t$	0.0101***	0.0047***	0.0111***	0.0059***	0.0042***	0.0139***	0.0071***	0.0021**	0.0148***			
	[0.0019]	[0.0014]	[0.0022]	[0.0014]	[0.0011]	[0.0022]	[0.0014]	[0.0010]	[0.0019]			
DR_{it}										0.0693***	0.0186***	-0.0102***
										[0.0021]	[0.0023]	[0.0013]
$DR_{it}*event_t$										0.0038**	0.0014*	0.0090***
										[0.0015]	[0.0008]	[0.0015]
Observations	145,674	139,020	145,246	145,674	139,020	145,246	161,808	152,936	161,340	67,856	65,761	67,694
R-squared	0.289	0.121	0.099	0.813	0.545	0.414	0.822	0.541	0.409	0.325	0.146	0.100
Firm FE	no	no	no	yes	yes	yes	yes	yes	yes	no	no	no
Ind-Year FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Clustered SE	ind	ind	ind	ind	ind	ind	ind	ind	ind	ind	ind	ind

Columns I–IX of this table shows the results of regressing firms' debt to asset ratio ($DebtA_{it}$), annual interest rates (IR_{it}), and investment to asset ratio ($InvA_{it}$) on a default risk variable that takes the value of one for the safest quintile of firms, up to five for the riskiest quintile of firms (DR_i), a dummy variable ($event_t$) that takes the value of zero for the years 2001 (columns I–VI), 2010 (columns VII–IX) and 2005, and one for the 2002–2004 (columns I–VI), 2011–2013 (columns VII–IX) and 2006–2008 periods, a dummy variable ($reform_t$) that takes the value of zero from 2001–2004 (columns I–VI) and 2010–2013 (columns VII–IX), and one from 2005–2008, and the interaction of the independent variables. Columns X–XII replicate the main tests from Table 3 for the 2005–2008 period. Standard errors are reported in brackets. The bottom of the table provides information on fixed effects and the clustering of standard errors. Details on control variables can be found in the text. ***, and ** denote statistical significance at the 1%, and the 5% levels, respectively.

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Table 6: Reform Effect - Industry-Level Sorting

Dep var:	I $DebtA_{it}$	II IR_{it}	III $InvA_{it}$
$DR_{ind} * event_t$	0.0023**	0.0039**	0.0021**
	[0.0010]	[0.0015]	[0.0009]
Observations	154,561	143,015	154,118
R-squared	0.207	0.116	0.057
Year FE	yes	yes	yes
Ind FE	yes	yes	yes
Controls	yes	yes	yes
Clustered SE	ind	ind	ind

This table shows the results of regressing firms' debt to asset ratio ($DebtA_{it}$) interest rates (IR_{it}), and investment to asset ratio ($InvA_{it}$) on a default risk measure that takes the value of one for the safest, up to five for the riskiest quintile of firms based on the riskiness of the industry in which the firms operate (DR_{ind}), and the interaction of the default risk measure with a dummy variable ($event_t$) that takes the value of zero for the pre-reform period from 2001–2005, and one for the post-reform period from 2006–2010. Standard errors are reported in brackets. The bottom of the table provides information on fixed effects and the clustering of standard errors. Further details on control variables can be found in the text. ** denotes statistical significance at the 5% level.

Table 7: Personal Bankruptcy Costs

Dep var:	I $DebtA_{it}$	II IR_{it}	III $InvA_{it}$	IV $DebtA_{it}$	V IR_{it}	VI $InvA_{it}$	VII $DebtA_{it}$	VIII IR_{it}	IX $InvA_{it}$
DR_{it}	0.0498***	0.0189***	-0.0085***	0.0511***	0.0215***	-0.0010	0.0783***	0.0188***	0.0004
	[0.0032]	[0.0021]	[0.0015]	[0.0035]	[0.0015]	[0.0015]	[0.0028]	[0.0017]	[0.0015]
$DR_{it} * event_t$	-0.0007	0.0037*	0.0036**	0.0045	0.0006	0.0037**	0.0039	-0.0003	0.0032
	[0.0031]	[0.0023]	[0.0017]	[0.0030]	[0.0017]	[0.0018]	[0.0031]	[0.0017]	[0.0021]
$herf\ owner_i$	-0.0060***	0.0008	0.0024						
	[0.0022]	[0.0013]	[0.0016]						
$herf\ owner_i * event_t$	-0.0076***	0.0013	-0.0067***						
	[0.0024]	[0.0014]	[0.0018]						
$herf\ owner_i * DR_{it}$	0.0048***	-0.0007	-0.0003						
	[0.0008]	[0.0005]	[0.0005]						
$herf\ owner_i * DR_{it} * event_t$	0.0037***	-0.0002	0.0014***						
	[0.0009]	[0.0005]	[0.0005]						
$ceo\ owner_i$				0.0089***	0.0048***	0.0161***			
				[0.0024]	[0.0010]	[0.0020]			
$ceo\ owner_i * event_t$				-0.0056**	-0.0016*	-0.0082***			
				[0.0024]	[0.0010]	[0.0020]			
$ceo\ owner_i * DR_{it}$				0.0044***	-0.0016***	-0.0029***			
				[0.0009]	[0.0003]	[0.0005]			
$ceo\ owner_i * DR_{it} * event_t$				0.0018**	0.0009**	0.0012**			
				[0.0009]	[0.0004]	[0.0006]			
$ceo\ age_i$							0.0267***	0.0046***	0.0191***
							[0.0025]	[0.0009]	[0.0023]
$ceo\ age_i * event_t$							-0.0071***	-0.0029**	-0.0070***
							[0.0025]	[0.0012]	[0.0023]
$ceo\ age_i * DR_{it}$							-0.0054***	-0.0008**	-0.0036***
							[0.0009]	[0.0003]	[0.0006]
$ceo\ age_i * DR_{it} * event_t$							0.0027***	0.0013***	0.0016**
							[0.0010]	[0.0005]	[0.0007]
Observations	124,502	121,262	124,221	124,502	121,262	124,221	98,005	95,386	97,793
R-squared	0.342	0.147	0.116	0.342	0.147	0.110	0.354	0.162	0.133
Ind-Year FE	yes	yes	yes	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes	yes	yes	yes
Clustered SE	ind	ind	ind	ind	ind	ind	ind	ind	ind

This table shows the results of regressing firms' debt to asset ratio ($DebtA_{it}$), annual interest rates (IR_{it}), and investment to asset ratio ($InvA_{it}$) on a lagged default risk variable that takes the value of one for the safest quintile of firms, up to five for the riskiest quintile of firms (DR_{it}), a dummy variable ($event_t$) that takes the value of zero for the pre-reform period from 2001–2005, and one for the post-reform period from 2006–2010, a variable that sorts firms into quintiles according to the Herfindahl index of ownership concentration ($herf\ owner_i$) in columns I–III, a variable that sorts firms into quintiles according to their CEO ownership share ($ceo\ owner_i$) in columns IV–VI, a variable that sorts firms into quintiles according to their CEO's age taking the highest value for the youngest quintile of CEOs ($ceo\ age_i$) in columns VII–IX, and the interactions of the independent variables. Standard errors are reported in brackets. The bottom of the table provides information on fixed effects and the clustering of standard errors. Details on control variables can be found in the text. ***, **, and * denote statistical significance at the 1%, the 5%, and the 10% levels, respectively.

Table 8: Cross-Sectional Tests

	I	II	III	IV	V	VI
		Tangibility			Investment Opportunities	
Dep var:	$DebtA_{it}$	IR_{it}	$InvA_{it}$	$DebtA_{it}$	IR_{it}	$InvA_{it}$
DR_{it}	0.0659***	0.0168***	0.0155***	0.0866***	0.0206***	0.0033**
	[0.0045]	[0.0024]	[0.0019]	[0.0027]	[0.0017]	[0.0015]
$DR_{it} * event_t$	0.0077*	0.0075***	-0.0151***	-0.0067**	-0.0021	0.0025
	[0.0041]	[0.0021]	[0.0029]	[0.0029]	[0.0019]	[0.0017]
$tang_i$	0.0054	0.0019	0.0797***			
	[0.0035]	[0.0016]	[0.0037]			
$tang_i * event_t$	-0.0173***	0.0014	-0.0590***			
	[0.0036]	[0.0014]	[0.0038]			
$tang_i * DR_{it}$	-0.0009	0.0000	-0.0091***			
	[0.0012]	[0.0005]	[0.0008]			
$tang_i * DR_{it} * event_t$	0.0024**	-0.0012**	0.0092***			
	[0.0012]	[0.0005]	[0.0010]			
IO_i				0.0400***	0.0042***	0.0359***
				[0.0025]	[0.0013]	[0.0031]
$IO_i * event_t$				-0.0144***	-0.0025*	-0.0194***
				[0.0025]	[0.0014]	[0.0026]
$IO_i * DR_{it}$				-0.0078***	-0.0015***	-0.0044***
				[0.0008]	[0.0004]	[0.0007]
$IO_i * DR_{it} * event_t$				0.0058***	0.0019***	0.0016***
				[0.0008]	[0.0004]	[0.0006]
Observations	143,153	139,191	142,793	139,034	135,361	139,916
R-squared	0.313	0.142	0.132	0.340	0.140	0.117
Ind-Year FE	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes
Clustered SE	ind	ind	ind	ind	ind	ind

This table shows the results of regressing firms' debt to asset ratio ($DebtA_{it}$), interest rates (IR_{it}), and investment to asset ratio ($InvA_{it}$) on a lagged default risk variable that takes the value of one for the safest quintile of firms, up to five for the riskiest quintile of firms (DR_{it}), a dummy variable ($event_t$) that takes the value of zero for the pre-reform period from 2001–2005, and one for the post-reform period from 2006–2010, a variable that sorts firms into quintiles according to their pre-reform level of asset tangibility ($tang_i$) in columns I–III, and a variable that sorts firms into quintiles according to their pre-reform level of investment opportunities (IO_i) in columns IV–VI, and the interactions of all independent variables. Standard errors are reported in brackets. The bottom of the table provides information on fixed effects and the clustering of standard errors. Details on control variables can be found in the text. ***, **, and * denote statistical significance at the 1%, the 5%, and the 10% levels, respectively.

Table 9: Investment - Growth in Firm Profits

Dep var:	I	II	III	IV	V	VI	VII	VIII
				$\Delta\, Profits_{it,t-1}/Assets_{it-1}$				
DR_{it}	0.0093***	0.0126***	0.0118***	0.0056***	0.0067***	0.0052***	0.0028*	0.0106***
	[0.0008]	[0.0008]	[0.0008]	[0.0015]	[0.0013]	[0.0012]	[0.0015]	[0.0010]
$DR_{it}*event_t$	0.0014*	0.0027***	0.0027***	-0.0024	-0.0019	-0.0006	0.0011	-0.0055***
	[0.0007]	[0.0008]	[0.0009]	[0.0019]	[0.0019]	[0.0015]	[0.0023]	[0.0013]
$herf\ owner_i$				0.0059***				
				[0.0013]				
$herf\ owner_i*event_t$				-0.0030*				
				[0.0017]				
$herf\ owner_i*DR_{it}$				-0.0016***				
				[0.0004]				
$herf\ owner_i*DR_{it}*event_t$				0.0019***				
				[0.0004]				
$ceo\ owner_i$					0.0070***			
					[0.0010]			
$ceo\ owner_i*event_t$					-0.0044***			
					[0.0015]			
$ceo\ owner_i*DR_{it}$					-0.0019***			
					[0.0003]			
$ceo\ owner_i*DR_{it}*event_t$					0.0015***			
					[0.0005]			
$ceo\ age_i$						0.0071***		
						[0.0012]		
$ceo\ age_i*event_t$						-0.0052***		
						[0.0015]		
$ceo\ age_i*DR_{it}$						-0.0014***		
						[0.0004]		
$ceo\ age_i*DR_{it}*event_t$						0.0011**		
						[0.0005]		
$tang_i$							-0.0024*	
							[0.0013]	
$tang_i*event_t$							0.0015	
							[0.0019]	
$tang_i*DR_{it}$							-0.0004	
							[0.0004]	
$tang_i*DR_{it}*event_t$							0.0004	
							[0.0006]	
IO_i								0.0202***
								[0.0012]
$IO_i*event_t$								-0.0162***
								[0.0016]
IO_i*DR_{it}								-0.0031***
								[0.0003]
$IO_i*DR_{it}*event_t$								0.0024***
								[0.0005]
Observations	183,866	164,102	164,102	138,140	138,140	98,182	143,249	139,250
R-squared	0.013	0.028	0.082	0.119	0.119	0.137	0.122	0.127
Year FE	yes	yes	-	-	-	-	-	-
Ind FE	no	yes	-	-	-	-	-	-
Ind-Year FE	no	no	yes	yes	yes	yes	yes	yes
Controls	no	yes	yes	yes	yes	yes	yes	yes
Clustered SE	ind	ind	ind	ind	ind	ind	ind	ind

This table shows the results of regressing firms' growth rate in profits scaled by assets ($\Delta\, Profits_{it,t-1}/Assets_{it-1}$) on a lagged default risk variable that takes the value of one for the safest quintile of firms, up to five for the riskiest quintile of firms (DR_{it}), a dummy variable ($event_t$) that takes the value of zero in the pre-reform period from 2001–2005, and one for the post-reform period from 2006–2010, a variable that sorts firms into quintiles according to their ownership concentration ($herf\ owner_i$) in column IV, a variable that sorts firms into quintiles according to their CEO ownership share ($ceo\ owner_i$) in column V, a variable that sorts firms into quintiles according to their CEO's age taking the highest value for the youngest CEOs ($ceo\ age_i$) in column VI, a variable that sorts firms into quintiles according to their pre-reform level of tangibility ($tang_i$) in column VII, a variable that sorts firms into quintiles according to their pre-reform level of investment opportunities (IO_i) in column VIII, and the interactions of all independent variables. Standard errors are reported in brackets. The bottom of the table provides information on fixed effects and the clustering of standard errors. Details on control variables can be found in the text. ***, **, and * denote statistical significance at the 1%, the 5%, and the 10% levels, respectively.

Table 10: Investment - Cash Flow Volatility

Dep var:	I	II	III	IV	V	VI	VII	VIII
				$cf\ vola_{it}$				
DR_{it}	0.1439*** [0.0180]	0.1251*** [0.0194]	0.1327*** [0.0180]	0.5065*** [0.0466]	0.4043*** [0.0461]	0.3882*** [0.0425]	0.0874** [0.0395]	0.4758*** [0.0361]
$DR_{it} * event_t$	0.0528*** [0.0178]	0.0556*** [0.0159]	0.0398*** [0.0147]	0.0047 [0.0423]	0.0084 [0.0442]	-0.0826* [0.0452]	0.0433 [0.0462]	-0.1199*** [0.0389]
$herf\ owner_i$				0.3264*** [0.0312]				
$herf\ owner_i * event_t$				-0.1525*** [0.0350]				
$herf\ owner_i * DR_{it}$				-0.1143*** [0.0109]				
$herf\ owner_i * DR_{it} * event_t$				0.0223** [0.0109]				
$ceo\ owner_i$					0.1875*** [0.0323]			
$ceo\ owner_i * event_t$					-0.0659* [0.0377]			
$ceo\ owner_i * DR_{it}$					-0.0764*** [0.0115]			
$ceo\ owner_i * DR_{it} * event_t$					0.0203* [0.0122]			
$ceo\ age_i$						0.3173*** [0.0351]		
$ceo\ age_i * event_t$						-0.1925*** [0.0427]		
$ceo\ age_i * DR_{it}$						-0.0651*** [0.0106]		
$ceo\ age_i * DR_{it} * event_t$						0.0470*** [0.0129]		
$tang_i$							-0.0450 [0.0382]	
$tang_i * event_t$							-0.0027 [0.0475]	
$tang_i * DR_{it}$							0.0255** [0.0112]	
$tang_i * DR_{it} * event_t$							0.0020 [0.0139]	
IO_i								0.4505*** [0.0319]
$IO_i * event_t$								-0.2657*** [0.0367]
$IO_i * DR_{it}$								-0.1065*** [0.0098]
$IO_i * DR_{it} * event_t$								0.0558*** [0.0120]
Observations	43,109	43,109	43,109	28,986	28,986	22,855	34,190	33,015
R-squared	0.373	0.407	0.417	0.467	0.463	0.470	0.450	0.460
Year FE	yes	yes	-	-	-	-	-	-
Ind FE	no	yes	-	-	-	-	-	-
Ind-Year FE	no	no	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes	yes	yes
Clustered SE	ind	ind	ind	ind	ind	ind	ind	ind

This table shows the results of regressing firms' cash flow volatility ($cf\ vola_{it}$) on a default risk variable that takes the value of one for the safest quintile of firms, up to five for the riskiest quintile of firms (DR_{it}), a dummy variable ($event_t$) that takes the value of zero in the pre-reform period from 2001–2005, and one for the post-reform period from 2006–2010, a variable that sorts firms into quintiles according to their ownership concentration ($herf\ owner_i$) in column IV, a variable that sorts firms into quintiles according to their CEO ownership share ($ceo\ owner_i$) in column V, a variable that sorts firms into quintiles according to their CEO's age with the highest value for the youngest CEOs ($ceo\ age_i$) in column VI, a variable that sorts firms into quintiles according to their pre-reform level of tangibility ($tang_i$) in column VII, a variable that sorts firms into quintiles according to their pre-reform level of investment opportunities (IO_i) in column VIII, and the interactions of all independent variables. For the dependent variable, cash flow volatility ($cf\ vola_{it}$) is computed separately for the pre-reform and post-reform period. The default rank variable and the control variables are the averages of the variables for the respective period. Standard errors are reported in brackets. The bottom of the table provides information on fixed effects and the clustering of standard errors. Details on control variables can be found in the text. ***, **, and * denote statistical significance at the 1%, the 5%, and the 10% levels, respectively.

Table 11: Innovation

Dep var:	I $RnDA_{it}$	II $RnDA_{it}$	III $RnDA_{it}$	IV $PatentsA_{it}$	V $PatentsA_{it}$	VI $PatentsA_{it}$	VII $PatentsA_{it}$
DR_{it}	-0.0044***	-0.0018***	-0.0022**	-0.0091***	-0.0075***	-0.0070***	-0.0034***
	[0.0007]	[0.0005]	[0.0006]	[0.0019]	[0.0017]	[0.0018]	[0.0008]
$DR_{it} * event_t$	0.0010*	0.0012**	0.0013**	0.0052***	0.0042***	0.0036**	0.0015**
	[0.0006]	[0.0006]	[0.0006]	[0.0016]	[0.0015]	[0.0016]	[0.0007]
Observations	30,006	28,603	28,603	68,270	64,748	64,748	164,120
R-squared	0.015	0.203	0.276	0.008	0.077	0.132	0.116
Year FE	yes	yes	-	yes	yes	-	-
Ind FE	no	yes	-	no	yes	-	-
Ind-Year FE	no	no	yes	no	no	yes	yes
Controls	no	yes	yes	no	yes	yes	yes
Clustered SE	ind	ind	ind	ind	ind	ind	ind

This table shows the results of regressing firms' R&D expenditures to asset ratio ($RnDA_{it}$) and the number of annual patent applications ($PatentsA_{it}$) per billion won of firms' assets on a lagged default risk variable that takes the value of one for the safest quintile of firms, up to five for the riskiest quintile of firms (DR_{it}), and the interaction of the default risk variable with a dummy variable ($event_t$) that takes the value of zero for the pre-reform period from 2001–2005, and one for the post-reform period from 2006–2010. Standard errors are reported in brackets. The bottom of the table provides information on fixed effects and the clustering of standard errors. Details on control variables can be found in the text. ***, **, and * denote statistical significance at the 1%, the 5%, and the 10% levels, respectively.

Appendix A. Unified Bankruptcy Act

This section lists the additional changes in corporate reorganization law due to the UBA.

- While the UBA does not contain an automatic stay mechanism, the court may grant a comprehensive stay order restricting claim enforcement of secured and unsecured creditors. Under the CRA the debtor had to apply to the court for stay orders for each creditor separately.

- Under the CRA, all creditors needed to file their claims before a deadline set by the court for the claims to be considered. The new act assumes all claims to be filed if they appear on a list of creditors submitted by the receiver.

- Under the UBA each creditor is guaranteed to receive at least the amount they would receive under liquidation unless the creditor agrees to a lower amount. The old law did not provide such a guarantee to creditors.

- Under the UBA, the establishment of a creditors' committee is mandatory. The creditor committee coordinates the interest of the creditors and may demand specific information from the debtor and request an investigation of the rightfulness of management control during rehabilitation.

- Under the UBA, international bankruptcy proceedings may be recognized in Korea for the settlement of international cases, whereas under the old law only bankruptcy proceedings filed for in Korea were recognized.

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