The Economics of Legal Uncertainty*

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Abstract

In this paper, we examine the impact of legal uncertainty on economic activity. We develop a simple model that distinguishes between two types of legal uncertainty: idiosyncratic (diversifiable) and systematic (nondiversifiable), both of which can reduce economic activity. We test the model's predictions using micro-level data on bankruptcy judges and corporate loans in Korea. Exploiting random assignment of cases to judges and exogenous judge rotations in the judicial system, we compute time-varying court-level measures of debtor-friendliness and legal uncertainty as perceived by debtors and creditors. Our results show that firms tend to file for restructuring in courts with high levels of debtor-friendliness and low levels of legal uncertainty. We also find that legal uncertainty decreases the size of credit markets, predominantly for high-risk firms. Our analysis further indicates that credit supply is less sensitive to idiosyncratic legal uncertainty than credit demand, as banks can diversify idiosyncratic legal uncertainty, whereas firms cannot.

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1 Introduction

A fundamental link between law and economic development has been recognized at least since the 19th century. Max Weber famously attributed the emergence of modern industrial capitalism to the rule of law, and specifically to legal certainty (Trubek, 1972). However, while the rule of law reduces legal uncertainty, legal uncertainty remains a feature of any legal system due to factors such as judicial discretion and changes in the law.[1] Despite the potentially important role of legal uncertainty in economic development, there have been surprisingly few attempts to study the link between legal uncertainty and economic activity. The objective of this paper is to address this gap in the literature.

We begin our analysis by developing a theoretical framework to characterize the link between legal uncertainty and economic activity.[2] We study a supplier-producer relationship where a legal dispute arises with some probability. Due to legal uncertainty, the transfer between these two risk-averse parties in the event of a legal dispute is uncertain. We identify three distinct sources of legal uncertainty. First, assignment uncertainty results from the random assignment of legal disputes to judges. Second, decision uncertainty reflects the unpredictability of a given judge's rulings. Third, parameter uncertainty captures uncertainty about parameters of the legal system that systematically affect legal disputes, such as potential changes in the law. We show that assignment and decision uncertainty are idiosyncratic in nature, as they can be diversified by a supplier or producer exposed to a large number of legal disputes. In contrast, parameter uncertainty cannot be diversified, as it systematically affects all legal disputes. We further show that learning about a legal regime mitigates legal uncertainty. In this context, the possibility of a legal regime change introduces the risk of losing the information about the current legal regime, which in turn generates systematic legal uncertainty.

In the second part of our paper, we exploit a unique institutional setting in Korea and use detailed micro-level data on bankruptcy judges' decisions in restructuring cases and on corporate loans to test the empirical predictions from our theoretical framework. We exploit differences in

[1] The tension between legal certainty and judicial discretion is also a central issue in modern legal philosophy (see, e.g., Dworkin, 1963; Hart, 2013).

[2] In line with the literature, and as discussed in further detail in Section 2, we refer to a single concept of uncertainty throughout the paper capturing aspects of both risk and uncertainty.

bankruptcy judges' interpretation of the law, which we refer to as judge types. Our goal is to measure judge types as perceived by debtors and creditors, rather than to develop the most sophisticated econometric model that employs data and technology that was not available to market participants at the time. Specifically, we develop a measure of judge types that reflects the information, resources, and technology that were available to market participants at the time.

In the Korean court system, judges are typically appointed as bankruptcy judges for a single two-year term, and are subsequently replaced by other judges. As a result, their type is unknown at the start of their term. To quantify the judges' types, we follow a two-step approach. First, we categorize judges' decisions in restructuring cases as either debtor-friendly or creditor-friendly. Second, we create a time-varying measure of judges' types in terms of their perceived debtor-friendliness based on a simple Bayesian learning model. The model assumes that market participants learn about a judge's type from their decisions over time.[3] While it is possible to estimate a more advanced model that takes into account other factors, such as firm-specific characteristics or selection of cases into the bankruptcy system, we do not believe that this approach is adequate, since market participants are unlikely to have access to or were able to process such information at the time.

Using our measures of judge types and the unique institutional setting, we can compute three court-level measures of legal uncertainty as perceived by creditors and debtors, which correspond to systematic and idiosyncratic sources of legal uncertainty in our theoretical framework.[4] The first measure is assignment uncertainty, which arises from perceived differences in judges' debtor-friendliness within a specific court. Because cases are randomly assigned to judges, these differences in judges' types generate assignment uncertainty. We quantify it by computing the standard deviation of judges' types in a given court at a given point in time. Assignment uncertainty is idiosyncratic and diversifiable. The second measure is type uncertainty, which arises from market participants' uncertainty about individual judges' types. Learning about judge types from their decisions reduces type uncertainty. We measure this information effect by taking the average number

[3] We show that judges who make more debtor-friendly decisions in the first half of their term continue to do so in the second half, indicating that debtor-friendliness is a persistent characteristic of individual judges.

[4] As judges approach the end of their term, one may conjecture that they exert less influence over the restructuring process. However, since early decisions, particularly the acceptance or dismissal of a restructuring filing, have significant weight and shape the trajectory of the case, judges have a significant impact on a case even if they do not oversee it in its entirety.

of decisions made by judges in a given court up to a given month. The third measure is regime uncertainty. Replacing judges in a given court increases legal uncertainty, as agents are less informed about new judges. We measure this effect by calculating the fraction of the current judges' term in a given court that has passed up to a given month. Type and regime uncertainty correspond to parameter uncertainty in our model, which is systematic and nondiversifiable.[5] As firms are strictly assigned to a specific bankruptcy court in Korea, different firms are exposed to different variation in judges' types and legal uncertainty in the cross-section and over time.

Our novel measures of economic uncertainty, which are based on legal uncertainty, have the advantage of not being systematically related to economic conditions, unlike many other measures of uncertainty (see, e.g., Bloom, 2014). This is because variation in our measures of legal uncertainty is driven by exogenous judge rotations within the Korean court system and the random assignment of cases to judges, which are not related to economic conditions. Our measures are therefore particularly valuable in assessing the impact of uncertainty on economy activity.

We start our empirical analysis by assessing the validity and relevance of our measures of debtor-friendliness and legal uncertainty. To establish whether our measures capture relevant information that impacts economic decisions, we examine their ability to predict restructuring filings across different courts. Since firms initiate restructuring filings in Korea, we expect to observe more restructuring filings at courts that have more debtor-friendly judges and where legal uncertainty is lower. In our most rigorous test, we focus on a subset of firms that have the option to file at one of two courts. By examining filing decisions across two courts for the same firm, we can keep firm characteristics and economic conditions constant. We find that courts with higher levels of debtor-friendliness and lower assignment uncertainty are associated with more restructuring filings. Moreover, lower type uncertainty increases the number of restructuring filings at a given court. These findings suggest that our measures of debtor-friendliness and legal uncertainty capture decision-relevant information.

Next, we assess how legal uncertainty affects credit markets. Controlling for firm, bank, and time fixed effects, we find that loan volume at the firm-bank relationship level is higher when as-

[5] As most courts replace bankruptcy judges every two years, approximately half of all bankruptcy judges are replaced in a given year. This highlights the systematic and nondiversifiable nature of legal uncertainty due to judge replacements.

signment uncertainty in a given court is lower, when more information is available about current judges, and when judge replacement occurs further into the future. This suggests that both idiosyncratic and systematic sources of legal uncertainty have a negative effect on credit markets. In addition, we find that loan volume is higher when the court is more debtor-friendly. Although the effect of the courts' debtor-friendliness on credit is theoretically ambiguous, our findings suggest that the positive demand effect of more debtor-friendly judges dominates the negative supply effect. When we split firms into high, medium, and low default risk firms, we find that the sensitivity of credit to all three sources of legal uncertainty and courts' debtor-friendliness is concentrated within high-risk firms. This strengthens the interpretation of our results as being driven by exposure to legal uncertainty related to bankruptcy law.

After aggregating loan volume at the firm level, we find that a 10 percentage-point increase in assignment uncertainty reduces loan volume by 0.63 percent (2.07 percent for high-risk firms), 100 additional observations per judge increase loan volume by 0.79 percent (4.32 percent for high-risk firms), and getting one month closer to judge replacement reduces loan volume by 0.11 percent (0.25 percent for high-risk firms).

We further examine variation in interest rates and find that interest rates are lower when assignment uncertainty is higher. In contrast, higher type uncertainty and regime uncertainty are associated with higher interest rates. Together, these results are consistent with the idea that credit supply is relatively less sensitive to idiosyncratic sources of legal uncertainty (assignment uncertainty) than to systematic sources of legal uncertainty (type and regime uncertainty) compared with credit demand. In addition, as predicted by our model, interest rates are higher when the court is more debtor-friendly, as more debtor-friendly judges increase credit demand but reduce credit supply. Finally, we show that changes in credit levels and interest rates translate into changes in real investment. Specifically, when assignment uncertainty is lower, more information is available about current judges, and judge replacement happens further in the future, we observe higher investment. As before, the results described in this paragraph are driven by high-risk firms.

To strengthen the validity of our empirical analysis, we conduct several robustness tests. First, we demonstrate that our results are not sensitive to assumptions about the strength of agents' prior beliefs about judge types. Second, we show that firms and banks do not derive estimates of judge

types based on information that is not reflected in our estimation of judge types. Specifically, when we separately include fully-informed judge types based on all observations of a judge's decisions in our estimation, it has no independent explanatory power for loan volume. Third, we establish that the results are not driven by differences in bank quality across different courts by including bank-time fixed effects. Fourth, we show that the results are not driven by industry-specific shocks by including industry-time fixed effects. Fifth, we show that our measures are not correlated with economic conditions. Finally, while our measures of debtor-friendliness and assignment uncertainty fluctuate over time within a specific term, they do not systematically vary over time when aggregated across all judges' terms. This implies that our measures are not systematically related to changes in the quality of judges' decisions over time.[6]

Our analysis has important economic and policy implications.[7] Reforms of the judicial or legal systems may reduce legal uncertainty, for example by limiting the frequency of judge rotations, limiting judicial discretion, removing random judge assignment, increasing transparency, and utilizing information technology to enhance the predictability of legal outcomes. Stricter adherence to precedent can reduce legal uncertainty by making future decisions more predictable. However, it can also make legal uncertainty more systematic, since important decisions systematically affect legal outcomes going forward. Our results also have implications for the diversification of legal uncertainty through intermediaries like banks, insurance companies, or investment funds. Finally, our analysis has implications for the boundary of the firm, as the boundaries of firms may affect the diversification of legal disputes, such as through mergers and acquisitions.

A substantial body of research investigates how different sources of uncertainty impact the economy (see, e.g., Bloom, 2014), including regulatory uncertainty (see, e.g., Gissler et al., 2016; Agarwal et al., 2022) and tax uncertainty (see, e.g., Lee and Xu, 2019; Brok, 2019; Jacob et al., 2021). Despite a rich theoretical literature on legal uncertainty in law (see, e.g., Posner, 1973; D'Amato, 1983; Bebchuk, 1984; Craswell and Calfee, 1986; Kaplow, 1990; Bebchuk and Kaplow, 1992; Kaplow and Shavell, 1992; Kaplow, 1994; Harel and Segal, 1999; Guthrie, 2002; Brooks and Schwartz, 2005; Mullally, 2009; Geistfeld, 2010; Lang, 2017), few attempts have been made to ex-

[6]The uncertainty measures are also not correlated with case length, a common proxy for effective case resolution.

[7]It is important to note that policies aimed at reducing legal uncertainty may have other consequences that need to be considered when designing policy.

amine it empirically.[8] Our contribution is to provide direct measures of perceived legal uncertainty and to examine its economic implications. In addition, we distinguish between idiosyncratic and systematic sources of legal uncertainty, highlighting their distinct implications depending on the ability of economic agents to diversify legal uncertainty.

An in-depth study of legal uncertainty is crucial for gaining a comprehensive understanding of its sources, impact, and potential policy implications. We show that legal uncertainty can significantly contribute to economic uncertainty. Furthermore, our analysis highlights the unique policy implications for the judicial system, the legal system, legislation, transparency, the boundaries of the firm, and intermediation. We thus provide important insights into how institutional design of the legal system affects economic outcomes.

This paper also contributes to the literature on law and finance by examining the impact of uncertainty regarding creditor protection in bankruptcy proceedings on the size of credit markets. Following the seminal work of La Porta et al. (1997, 1998), a number of studies have explored the relationship between creditor protection and the size of credit markets, with mixed results. Some studies find a positive relationship (see, e.g., Levine, 1998, 1999; Djankov et al., 2007; Qian and Strahan, 2007; Djankov et al., 2008; Haselmann et al., 2010; Campello and Larrain, 2016; Ponticelli and Alencar, 2016; Calomiris et al., 2017; Favara et al., 2021), while others find a negative one (Acharya and Subramanian, 2009; Acharya et al., 2011; Vig, 2013).[9] While existing research focuses on the level of creditor protection, our study adds to the literature by documenting the independent effect of uncertainty about the level of creditor protection in bankruptcy proceedings.

Finally, our analysis contributes to the literature on the random assignment of judges or decision-makers and the variation in their interpretation of the law. Previous studies have examined the influence of judge types ex post by using random judge assignment as an instrument (see, e.g., Anderson et al., 1999; Kling, 2006; Anwar et al., 2012; Chang and Schoar, 2013; Galasso and Schankerman, 2014; Dobbie and Song, 2015; Bernstein et al., 2019a,b; Antill, 2022; Arnold et al., 2022; Grindaker et al., 2022). In contrast, our study adopts an ex-ante approach by using random

[8] Exceptions include Lefstin (2006) and Farnsworth et al. (2010). Additionally, the World Bank's Doing Business Project, which collects data on ten aspects of business law from 175 countries, includes indicators related to legal uncertainty (Davis and Kruse, 2007).

[9] See Schoenherr and Starmans (2022) for an analysis that helps reconcile these opposing views.

judge assignment to measure legal uncertainty before a decision is made. Specifically, we quantify the legal uncertainty generated by random judge assignment and evaluate its impact on credit markets. Additionally, we demonstrate the persistence of judges' types by comparing their decisions in the first and second halves of their term.

2 Theoretical Framework

In this section, we present a stylized model that examines the relationship between a producer of a good or service who requires an input from a supplier. The supplier-producer relationship is subject to legal uncertainty, meaning that a legal dispute may arise between them with an unforeseeable outcome. Our objective is to provide a formal characterization of different types of legal uncertainty and investigate their impact on the demand for and supply of the input.

Knight (1921) established a fundamental distinction between risk and uncertainty (or ambiguity). According to Knight, risk is characterized by a known probability distribution, whereas uncertainty arises from agents' inability to forecast a precise probability distribution. Although our model focuses on the concept of risk, as defined by Knight, we acknowledge that in reality, agents encounter both risk and uncertainty. Hence, in line with the literature on uncertainty (see, e.g., Bloom, 2014), we refer to a single concept of uncertainty throughout this paper, which encompasses elements of both risk and uncertainty.

2.1 Model Setup

Consider a producer who requires an input from a supplier to produce a good. The supplier incurs a cost of $C > 0$ to produce the input. If the supplier provides the input and the producer generates the output, the producer earns revenue $R > C$. The endogenous price of the input is denoted by P. The surplus generated by production is $R - C > 0$, and the distribution of this surplus between the supplier and the producer is determined by the price P.

After the producer generates output, there is a legal dispute between the producer and the

supplier with exogenous probability π.[10] In the event of a legal dispute, it concerns an amount $D > 0$ of the producer's revenue R.[11] For ease of exposition, we assume $\pi = 1$ in this section. In Appendix A.2, we study the general case with $\pi \in [0,1]$. The key insights regarding the impact of legal uncertainty on production extend to the general case.

Ex ante, the allocation of the disputed amount D between the producer and the supplier is uncertain, reflecting legal uncertainty. Specifically, the portion of the disputed amount D allocated to the producer—the producer's share—is determined by the random variable $\Lambda \in [0,1]$. The supplier's share of the disputed amount D is equal to $1-\Lambda$. We assume that Λ follows a probability distribution characterized by a parameter vector $\theta \in \mathbb{R}^n$. However, the parameter θ is unknown, and agents in the economy hold homogeneous beliefs regarding its probability distribution.

Taken together, the producer's final payoff is given by $R-(1-\Lambda)D-P$, while the supplier's final payoff is given by $P-C+(1-\Lambda)D$. Both the producer and the supplier are guided by mean-variance objectives over their final payoffs, with the risk aversion parameter $\gamma > 0$. The reservation utility of both agents is normalized to zero.

In our empirical setting, the producer is a firm that requires capital from a lender. In the event of default, a legal dispute may arise between the firm and its lenders. Legal uncertainty arises from the fact that the amount that lenders can recover from bankrupt firms is uncertain ex ante, owing to factors such as judicial discretion. The uncertainty surrounding the parameter θ may arise from limited knowledge on the part of both firms and lenders regarding how debtor- or creditor-friendly the legal environment is.

2.2 Demand, Supply, and Production

To determine the demand for and the supply of the input, we need to determine the expectation and variance of the producer's and supplier's payoffs. By applying the law of iterated expectations, we

[10] The probability of a legal dispute may be influenced by actions of suppliers and producers or the legal environment. While being beyond the scope of our analysis, endogenizing π could be an interesting extension of our model.

[11] We assume that the producer loses a fraction of the amount D in a legal dispute. The results are qualitatively identical if we assume that the supplier loses a fraction of the amount D or if we assume a general uncertain transfer between the supplier and the producer. As we demonstrate in the analysis below, whether the producer or the supplier receives a transfer in the legal dispute on average is irrelevant because the price adjusts to changes in the average transfer.

obtain the expected value of the producer's payoff as

$$\mathbb{E}[R-(1-\Lambda)D-P] = R-(1-\mathbb{E}[\mathbb{E}[\Lambda|\theta]])D-P.$$

Similarly, by applying the law of total variance, we obtain the variance of the producer's payoff as

$$\mathrm{Var}[R-(1-\Lambda)D-P] = D^2\,\mathrm{Var}[\Lambda] = D^2\left(\mathbb{E}\left[\mathrm{Var}[\Lambda|\theta]\right]+\mathrm{Var}\left[\mathbb{E}[\Lambda|\theta]\right]\right).$$

The variance of the producer's share, $\mathrm{Var}[\Lambda]$, is the measure of legal uncertainty in our model and can arise from two sources. First, *parameter uncertainty* is captured by $\mathrm{Var}\left[\mathbb{E}[\Lambda|\theta]\right]$ and arises because the parameter θ is uncertain. Second, *realization uncertainty* is captured by $\mathbb{E}\left[\mathrm{Var}[\Lambda|\theta]\right]$ and represents the uncertainty that persists even when the parameter θ is known.

The producer purchases the input at price P and produces the output if and only if

$$R-(1-\mathbb{E}[\mathbb{E}[\Lambda|\theta]])D-P-\frac{\gamma}{2}D^2\left(\mathbb{E}\left[\mathrm{Var}\left[\Lambda|\theta\right]\right]+\mathrm{Var}\left[\mathbb{E}\left[\Lambda|\theta\right]\right]\right)\geq 0,$$

which can be rewritten as

$$P \leq R-(1-\mathbb{E}[\mathbb{E}[\Lambda|\theta]])D-\frac{\gamma}{2}D^2\left(\mathbb{E}\left[\mathrm{Var}\left[\Lambda|\theta\right]\right]+\mathrm{Var}\left[\mathbb{E}\left[\Lambda|\theta\right]\right]\right). \tag{1}$$

We can calculate the expected payoff and variance for the supplier as follows:

$$\mathbb{E}[P-C+(1-\Lambda)D] = P-C+(1-\mathbb{E}[\mathbb{E}[\Lambda|\theta]])D,$$

and

$$\mathrm{Var}[P-C+(1-\Lambda)D] = D^2\,\mathrm{Var}[\Lambda] = D^2\left(\mathbb{E}\left[\mathrm{Var}[\Lambda|\theta]\right]+\mathrm{Var}\left[\mathbb{E}[\Lambda|\theta]\right]\right),$$

respectively. In particular, the producer and the supplier are equally exposed to legal uncertainty, measured by $\mathrm{Var}[\Lambda]$.[12]

The supplier is willing to produce the input at cost C and sell it to the producer at price P if and

[12]Note that the variance of the supplier's share $(1-\Lambda)$ is equal to the variance of the producer's share (Λ).

only if

$$P - C + (1 - \mathbb{E}[\mathbb{E}[\Lambda|\theta]])D - \frac{\gamma}{2}D^2(\mathbb{E}[\text{Var}[\Lambda|\theta]] + \text{Var}[\mathbb{E}[\Lambda|\theta]]) \geq 0,$$

which can be rearranged as

$$P \geq C - (1 - \mathbb{E}[\mathbb{E}[\Lambda|\theta]])D + \frac{\gamma}{2}D^2(\mathbb{E}[\text{Var}[\Lambda|\theta]] + \text{Var}[\mathbb{E}[\Lambda|\theta]]). \quad (2)$$

Thus, in order for production of the input and output to be profitable, there must exist a price P that satisfies both the demand constraint in equation (1) and the supply constraint in equation (2).

Proposition 1. *There exists an input price P at which the producer is willing to purchase the input from the supplier and produce the output, and the supplier is willing to produce the input and sell it to the producer if and only if*

$$R - C \geq \gamma D^2(\mathbb{E}[\text{Var}[\Lambda|\theta]] + \text{Var}[\mathbb{E}[\Lambda|\theta]]).$$

Production occurs when the surplus generated by production, $R - C$, outweighs the disutility arising from legal uncertainty that both the producer and supplier face. This disutility is equal to $\gamma D^2(\mathbb{E}[\text{Var}[\Lambda|\theta]] + \text{Var}[\mathbb{E}[\Lambda|\theta]])$. Production becomes less likely as the supplier's and the producer's risk aversion (i.e., γ), the size of the legal dispute (i.e., D), and the level of legal uncertainty (i.e., $\mathbb{E}[\text{Var}[\Lambda|\theta]] + \text{Var}[\mathbb{E}[\Lambda|\theta]]$) increase.[13]

2.3 Extensions

In this section, we explore several extensions to the baseline model that allow us to examine the impact of diversification, learning, legal regime changes, and random judge assignment on the production decision.

[13] Note that when the likelihood of a legal dispute is less than one, then the disutility arising from legal uncertainty that both the producer and supplier face is increasing in the likelihood of a legal dispute (see Appendix A.2).

2.3.1 Diversification

In this section, we study the role of diversification in mitigating legal uncertainty in an economy consisting of N suppliers and N producers, where $N > 1$. Each supplier provides an equal fraction of $\frac{1}{N}$ of the input to each of the N producers and receives revenue of $\frac{P}{N}$ from each producer, resulting in total revenue of P.[14] We consider the case in which legal uncertainty is producer-specific, which means that the producer's share of the disputed amount D for producer $i \in N := \{1,\dots,N\}$ is described by the random variable Λ_i. In the supplier-producer relationship with producer i, the supplier's share is $\frac{1-\Lambda_i}{N}$. Each random variable Λ_i, $i \in N$, follows the distribution described in Section 2.1 and has the same unknown parameter θ. In addition, we assume that the random variables Λ_i, $i \in N$, are independent and identically distributed conditionally on θ. We denote by Λ a random variable with the same distribution as each Λ_i conditionally on θ.

The payoff of producer $i \in N$ is given by

$$R-(1-\Lambda_i)D-P,$$

and the payoff of a single supplier is given by

$$P-C+\sum_{i=1}^{N}\frac{1-\Lambda_i}{N}D.$$

The expectation and variance of a producer's payoff remain the same as in Section 2.2. In contrast, the expectation and variance of a supplier's payoff are derived in the following lemma.

Lemma 1. *The expectation of the supplier's payoff is given by*

$$\mathbb{E}\left[P-C+\sum_{i=1}^{N}\frac{1-\Lambda_i}{N}D\right]=P-C+\left(1-\mathbb{E}\left[\mathbb{E}[\Lambda|\theta]\right]\right)D.$$

[14] If each of the suppliers forms a relationship with a single producer, then the results from Section 2.2 apply.

The variance of the supplier's payoff is given by

$$\operatorname{Var}\left[P - C + \sum_{i=1}^{N} \frac{1-\Lambda_i}{N} D\right] = \frac{D^2}{N} \mathbb{E}\left[\operatorname{Var}\left[\Lambda|\theta\right]\right] + D^2 \operatorname{Var}\left[\mathbb{E}\left[\Lambda|\theta\right]\right].$$

Lemma 1 demonstrates that while realization uncertainty, $\mathbb{E}\left[\operatorname{Var}\left[\Lambda|\theta\right]\right]$, can be diversified, parameter uncertainty, $\operatorname{Var}\left[\mathbb{E}\left[\Lambda|\theta\right]\right]$, cannot be diversified. Specifically, the exposure to realization uncertainty decreases as the number of supplier-producer relationships N increases. In contrast, the exposure to systematic legal uncertainty remains because the parameter θ is unknown and systematically affects the payoffs across all supplier-producer relationships.

Proposition 2. *Consider an economy with N diversified suppliers. There exists an input price P at which producers are willing to purchase the input from the suppliers and produce the output, and the suppliers are willing to produce the input and sell it to the producers if and only if*

$$R - C \geq \gamma D^2 \left(\frac{1}{2}\left(1 + \frac{1}{N}\right) \mathbb{E}\left[\operatorname{Var}\left[\Lambda|\theta\right]\right] + \operatorname{Var}\left[\mathbb{E}\left[\Lambda|\theta\right]\right]\right).$$

While idiosyncratic legal uncertainty, $\mathbb{E}\left[\operatorname{Var}\left[\Lambda|\theta\right]\right]$, can be diversified and therefore has a lesser impact on diversified suppliers, systematic legal uncertainty, $\operatorname{Var}\left[\mathbb{E}\left[\Lambda|\theta\right]\right]$, cannot be diversified and therefore affects both suppliers and producers. By reducing overall exposure to legal uncertainty, diversification can increase production in the economy, as indicated by Proposition 2.[15] This result contrasts with Proposition 1, which only considers the relationship between a single supplier and producer and does not account for the effects of diversification.

2.3.2 Learning about the Legal Regime

The supplier and the producer may be able to gather information about the legal regime, enabling them to make better predictions about the outcomes of legal disputes. To demonstrate the impact of learning, suppose that there is a signal S that agents observe, which is informative about the

[15] When legal uncertainty is specific to the producer, as we consider here, suppliers are able to diversify idiosyncratic legal uncertainty across their various producer relationships. In contrast, if legal uncertainty were specific to the supplier, producers would be able to diversify idiosyncratic legal uncertainty across their various supplier relationships.

producer's share Λ. In this case, we have $\text{Var}[\mathbb{E}[\Lambda|S]] > 0$. Using the law of total variance, we obtain

$$\mathbb{E}[\text{Var}[\Lambda|S]] = \text{Var}[\Lambda] - \text{Var}[\mathbb{E}[\Lambda|S]] < \text{Var}[\Lambda].$$

This inequality shows that, on average, legal uncertainty decreases as new information regarding the legal regime emerges. We incorporate learning more formally into the model in Section 5.1.

2.3.3 Legal Regime Change

The legal and institutional environment may change over time, which may impact the way how disputes between suppliers and producers are decided. For instance, changes in the law or the replacement of judges within the legal system can alter the average producer-friendliness of judges.

To account for the possibility of a future change in the legal regime, we assume that the producer's share is determined by the "future" legal regime with probability $q \in [0,1]$. In this case, the producer's share is represented by the random variable Λ_f, characterized by a parameter $\theta_f \in \mathbb{R}^n$. Conversely, if the dispute arises under the "current" legal regime, which occurs with probability $1-q$, the producer's share is determined by the random variable Λ_c, with parameter $\theta_c \in \mathbb{R}^n$. The parameters θ_c and θ_f are unknown, and all agents in the economy share the same beliefs about their probability distributions. We denote by $\eta \in \{0,1\}$ the random variable that determines whether the legal dispute is subject to the current or future legal regime, where $\eta = 1$ corresponds to the future legal regime. In particular, $\mathbb{P}(\eta = 1) = q$. We further assume that the random variables η, Λ_c, and Λ_f are independent.

As the value of q increases, the probability that the future legal regime will determine the resolution of the legal dispute between the supplier and the producer increases. A larger value of q can therefore be interpreted as a legal dispute moving closer to the date of a legal regime change.

Incorporating the possibility of a change in the legal regime, we can express the producer's payoff as:

$$R - \left(1 - \left(\eta\Lambda_f + (1-\eta)\Lambda_c\right)\right) D - P.$$

The supplier's payoff is given by

$$P - C + \left(1 - \left(\eta \Lambda_f + (1-\eta)\Lambda_c\right)\right) D.$$

Proposition 3. *There exists an input price P at which the producer is willing to purchase the input from the supplier and produce the output, and the supplier is willing to produce the input and sell it to the producer if and only if*

$$R - C \geq \gamma D^2 \left(q \operatorname{Var}[\Lambda_f] + (1-q) \operatorname{Var}[\Lambda_c] + q(1-q) \left(\mathbb{E}[\Lambda_c] - \mathbb{E}[\Lambda_f] \right)^2 \right).$$

Proposition 3 has two key implications when assigning more weight to the future legal regime. First, if the future legal regime is more uncertain (i.e., $\operatorname{Var}[\Lambda_f] > \operatorname{Var}[\Lambda_c]$), giving greater weight to the future legal regime would result in a decrease in production. For example, the legal uncertainty under the current legal regime may be lower as a result of agents having more information about it. Second, the possibility of a change in the legal regime introduces an additional source of uncertainty if the average producer's shares under the two regimes are different (i.e., $\mathbb{E}[\Lambda_c] \neq \mathbb{E}[\Lambda_f]$). Giving more weight to the future legal regime can either increase or decrease this type of uncertainty.[16] It is worth noting that exposure to a change in the legal regime creates systematic legal uncertainty because it affects all legal cases in the economy and therefore cannot be diversified.

2.3.4 Random Judge Assignment

Random judge assignment is a crucial aspect of many legal systems. In our framework, we incorporate random judge assignment by assuming that the legal dispute between the producer and the supplier is assigned randomly to one of $J > 1$ judges. Let $\lambda_j \in [0,1]$ denote the producer's share when assigned to judge $j \in J := \{1, \ldots, J\}$, which is a random variable with a probability distribution characterized by a single parameter $\theta_j \in \mathbb{R}$. The random variable $\xi \in J$ describes the random allocation to judges, where $\mathbb{P}(\xi = j) = \frac{1}{J}$. The producer's share Λ is thus given by $\Lambda = \sum_{j \in J} \mathbb{1}_{\{\xi = j\}} \lambda_j$. The parameter vector θ for Λ is given by $\theta = (\theta_j)_{j \in J} \in \mathbb{R}^J$. The parameter θ is unknown, and all agents share identical beliefs regarding its probability distribution. Moreover,

[16] Note that the binary nature of the legal regime uncertainty means that it is highest when $q = \frac{1}{2}$.

we assume that the components θ_j are independent across all j. We further assume that the random variables ξ and $(\lambda_j)_{j\in J}$ are independent conditionally on θ, and that ξ and θ are independent as well.

Lemma 2. *In the presence of random judge assignment, we have*

$$\mathrm{Var}\left[\mathbb{E}\left[\Lambda|\theta\right]\right] = \frac{1}{J^2}\sum_{j\in J}\mathrm{Var}\left[\mathbb{E}\left[\lambda_j\middle|\theta_j\right]\right].$$

Lemma 2 identifies parameter uncertainty in the context of random judge assignment. Specifically, we show that the total parameter uncertainty can be expressed as a weighted sum of the parameter uncertainty associated with each individual judge j. The parameter uncertainty associated judge j is given by $\mathrm{Var}\left[\mathbb{E}\left[\lambda_j\middle|\theta_j\right]\right]$.

Lemma 3. *In the presence of random judge assignment, we have*

$$\mathbb{E}\left[\mathrm{Var}\left[\Lambda|\theta\right]\right] = \underbrace{\frac{1}{J}\sum_{j\in J}\left(\mathbb{E}\left[\lambda_j\right] - \frac{1}{J}\sum_{k\in J}\mathbb{E}\left[\lambda_k\right]\right)^2}_{\textit{Assignment uncertainty}} + \underbrace{\frac{1}{J}\sum_{j\in J}\mathrm{Var}\left[\lambda_j\right] - \frac{1}{J^2}\sum_{j\in J}\mathrm{Var}\left[\mathbb{E}\left[\lambda_j\middle|\theta_j\right]\right]}_{\textit{Decision uncertainty}}.$$

Lemma 3 highlights the presence of two sources of realization uncertainty in the context of random judge assignment: *assignment uncertainty* and *decision uncertainty*. Assignment uncertainty arises because the random assignment of legal cases to judges creates uncertainty if there are different types of judges, where a judge's type is captured by their expected producer's share, $\mathbb{E}\left[\lambda_j\right]$. Decision uncertainty arises because, even after the assignment to a particular judge is known, there is still uncertainty about the judge's decision due to idiosyncratic factors that influence their decision-making process (see, e.g., Chen et al., 2016).

As discussed in Section 2.3.1, $\mathbb{E}\left[\mathrm{Var}\left[\Lambda|\theta\right]\right]$ captures the diversifiable component of legal uncertainty. In the context of random judge assignment, this implies that both assignment and decision uncertainty can be diversified across multiple legal cases. In contrast, parameter uncertainty is systematic and cannot be diversified, as it affects all legal cases. For example, if there is uncertainty regarding whether judges systematically rule in favor of suppliers or producers, this uncertainty

cannot be diversified away.

2.4 Empirical Implications

In this section, we summarize the key empirical implications of our model that we test in the second part of the paper. Given that our empirical setting focuses on lender-borrower relationships, we relate the implications of our model to this specific context.

Our analysis reveals a fundamental insight: higher legal uncertainty is associated with lower production. In the context of our empirical setting, this translates into a reduction in the size of credit markets.

Implication 1. *A higher level of legal uncertainty reduces the demand for and supply of credit, which results in smaller credit markets.*

Our model distinguishes between two types of legal uncertainty: idiosyncratic and systematic. Assignment and decision uncertainty are examples of idiosyncratic uncertainty, as they are uncorrelated across legal cases and can be diversified away. In contrast, parameter uncertainty affects all legal cases and is non-diversifiable. In the context of credit markets, banks are more diversified because they provide loans to a large number of firms. However, in case of bankruptcy, all lending relationships of a given firm are systematically affected, which means that firms are equally exposed to idiosyncratic and systematic legal uncertainty. Consequently, an increase in idiosyncratic legal uncertainty has a larger effect on the demand for credit.

Implication 2. *Banks are less sensitive to idiosyncratic legal uncertainty than firms, and therefore credit supply is less affected by idiosyncratic legal uncertainty than credit demand.*

Learning about the legal regime can reduce legal uncertainty. By observing judges and their decisions in bankruptcy cases, banks and firms can reduce uncertainty regarding judges' types. As a result, learning about judges can reduce parameter uncertainty, which is a systematic type of legal uncertainty.

Implication 3. *Reducing legal uncertainty through learning about judge types, increases both the supply of and demand for credit increase, resulting in larger credit markets.*

A change in the legal regime often leads to increased legal uncertainty, as agents are typically better informed about the current legal regime than a new one. This loss of information can amplify systematic legal uncertainty, as agents have less knowledge about the rules and decision-making processes associated with the new legal regime. In our application, legal regime changes arise from judge rotations within the judicial system. There is a greater degree of legal uncertainty following the rotation date, since banks and firms have less information about the new judges compared to the current ones.[17]

Implication 4. *Moving closer in time to the date of judge rotation reduces the supply of and demand for credit, resulting in smaller credit markets.*

3 Institutional Background

This section provides an overview of the Korean bankruptcy code, the bankruptcy court system, and the role of judges in in-court restructuring proceedings.

3.1 Bankruptcy Courts in Korea

During our sample period, 14 District Courts were responsible for handling bankruptcy cases in Korea. Among these, nine courts had a separate division for bankruptcy cases (Busan, Changwon, Daegu, Daejeon, Gwangju, Incheon, Seoul, Suwon, Uijeongbu), while four courts dealt with bankruptcy cases through their civil law division (Cheongju, Chuncheon, Jeonju, Ulsan). One court initially handled bankruptcy cases through its criminal law division before establishing a separate bankruptcy division in February 2015 (Jeju). For simplicity, we refer to a court division that handles bankruptcy cases as the bankruptcy division or the bankruptcy court.

Of the 14 District Courts, nine exclusively handle cases in their local court district. The remaining five District Courts, located in cities with a High Court, have the jurisdiction to handle cases from a broader region. As illustrated in Figure 1, the District Courts in Seoul, Daejeon, Daegu,

[17] While on average a change in legal regime increases legal uncertainty, there may be cases where a change in legal regime actually reduces uncertainty if the current regime has a sufficiently high level of legal uncertainty.

Gwangju, and Busan have a wider jurisdiction that covers multiple court districts, whereas the District Courts in Changwon, Cheongju, Chuncheon, Incheon, Jeju, Jeonju, Suwon, Uijeongbu, and Ulsan only handle local cases.

Determination of Jurisdiction The jurisdiction of a bankruptcy court for a given firm in Korea is determined by geography. According to Article 3 (Jurisdiction) of the Debtor Rehabilitation and Bankruptcy Act, every bankruptcy case shall be placed under the exclusive jurisdiction of the principal District Court that has jurisdiction over the location of the debtor's principal office or place of business. Moreover, firms can file an application for a bankruptcy case with a District Court in the city with a High Court that has jurisdiction over the location of the debtor's principal office or place of business. This means that a firm can file for bankruptcy either with their local District Court or with the District Court in the city with the High Court covering their geographic location. For firms located in cities with a High Court, this implies that they have only one option to file their case with the local District Court. In contrast, firms located elsewhere have two options: they may either file with their local District Court or with the District Court in the city with the High Court covering their region. This procedure effectively divides Korea into five court zones for the purpose of bankruptcy jurisdiction (see Figure 1). Table 1 displays the filing options for firms located in different areas in Korea. Jurisdiction is strictly enforced, and we do not observe any change of address of firms in the twelve months prior to their filing in our data.

Bankruptcy Judges Unlike other countries, such as the United States, Korea does not have a system of specialized bankruptcy judges during our sample period. Instead, judges are considered generalists who rotate through various courts and different court divisions throughout their career. In particular, appointment to a bankruptcy division of a court does not require prior exposure to bankruptcy law. In fact, almost all judges start their term in a bankruptcy division with no prior experience in handling bankruptcy-related cases.

In most bankruptcy divisions, judges are appointed for a joint two-year term after which they are all replaced by new judges. Since the rotation occurs in the same month across all courts and the typical term is two years, on average, about half of all bankruptcy judges are replaced in a given year.

Bankruptcy cases in a given bankruptcy court are randomly assigned to individual judges, with one exception: If a debtor is related to a previous case, such as a subsidiary of a firm already in the bankruptcy process, or if the owner of the firm is involved in a personal bankruptcy case, the case is assigned to the judge who is already handling the related case.

3.2 Bankruptcy Law in Korea

The Debtor Rehabilitation and Bankruptcy Act, which took effect on April 1, 2006, is the relevant bankruptcy code for our sample period. The corporate restructuring procedure, known as "rehabilitation," resembles the Chapter 11 process in the U.S.[18] The reason for this similarity is that the Korean bankruptcy law was developed under the supervision of the IMF and World Bank during the Asian Financial Crisis, with the objective of adhering to international best practices, which, in practice, meant closely following U.S. bankruptcy law. Consequently, Korean bankruptcy law, as of April 2006, features a bargaining process similar to Chapter 11, in which a court-appointed custodian takes control of the firm and proposes a restructuring plan. Typically, the court appoints the incumbent manager as the custodian, except in cases where financial distress can be attributed to fraudulent activity by incumbent management, creditors provide reasonable grounds for appointing a third-party custodian, or the court deems the appointment of a third-party custodian essential. In practice, incumbent management remains in control in most restructuring cases (Ko, 2007), and negotiates a restructuring plan with the firm's creditors under court supervision.

In-court Restructuring Proceedings During our sample period, the average duration of a restructuring case is 19 months, with a median case length of 10 months. Figure 2 summarizes the steps involved in the in-court proceedings.[19] The process begins with a debtor filing for restructuring, and the filing is randomly assigned to a judge for review.[20] The first step in the review process is to determine whether the bankruptcy court where the case was filed has jurisdiction over the firm. If the judge determines that the case was filed under the wrong jurisdiction, the filing is

[18] In contrast to Chapter 11, prepackaged bankruptcy are not part of the Korean bankruptcy system before 2015.

[19] There are hardly any appeals in restructuring cases, since appeals courts are hesitant to intervene, as it is difficult to revert decisions that have already been implemented.

[20] While creditors have the legal right to file for restructuring, this is not observed in practice, since creditors prefer to enforce their claims outside of the bankruptcy system, where debtors are less protected against creditors' actions.

declined. Next, the judge assesses whether the firm has a realistic chance of surviving as a going concern, and whether its continuation value exceeds its liquidation value. This assessment must be made within ten days of the filing date, during which the judge mainly validates the plausibility of the estimates provided by the firm. During the review process, the judge may block the execution of collateral, the sale of assets, the issuance of debt, and the hiring of new workers. If the judge decides that the firm's continuation value exceeds its liquidation value, the case is accepted, and the restructuring proceedings commence. On the other hand, if the judge decides that the firm is not viable and that the liquidation value of the firm exceeds the continuation value, the case is dismissed, and the judge may order the liquidation of the firm. It is worth noting that even after the acceptance of a case, the judge has the authority to terminate the case and order liquidation of the firm at any stage of the process.

Once a case is accepted, the judge sets a date for the first assembly of interested parties and establishes the period during which stakeholders can report their claim to the court. Additionally, the judge appoints a custodian who assumes control of the firm's operations during the restructuring process. The custodian is responsible for proposing a first restructuring plan for the firm.

After the period for filing claims with the court ends, the custodian reviews the validity of the claims. External accountants are then consulted to value the claims and to update the liquidation and continuation value of the firm. At this stage, if the external accountants determine that the liquidation value of the firm exceeds its continuation value, the judge may terminate the case and order liquidation of the firm. Otherwise, the first assembly of interested parties is held to share the custodian's report with all parties and to outline the timeline of the restructuring procedure.[21]

After the first assembly of interested parties, the court sets a deadline for the submission of the restructuring plan.[22] The judge may extend the deadline if necessary. Once the custodian submits the restructuring plan, it is reviewed during the second assembly of interested parties, and a vote is taken. Although the judge may consider the vote, it is not binding, and it is ultimately up to the judge's discretion whether to approve or reject the plan. If the plan is rejected, the judge may order the liquidation of the firm. Alternatively, the judge may instruct the custodian to revise the plan, in which case another assembly of interested parties is held to repeat the same process until

[21] As of 2015, the assembly has been abolished, and all relevant information is shared with all parties through mail.
[22] Since 2015, this deadline is already determined when the case is first accepted.

a decision is made to either accept and execute the plan or to reject it.

Once a restructuring plan has been approved, it is implemented under court supervision. During this process, the judge assesses the firm's ability to implement all aspects of the restructuring plan and whether the firm is in good standing. At any point, the judge may determine that the firm failed to fully implement the plan, which would require the mandatory liquidation of the firm. It is also within the judge's discretion to determine when the firm has successfully implemented its commitments under the approved plan and is therefore allowed to graduate from the restructuring process. This is a crucial step for the firm, as it removes the threat of mandatory liquidation if the judge determines that the firm failed to fully implement the approved plan.

As the term of judges in a given court nears its end, their influence on the entire restructuring process of a firm that may file for bankruptcy diminishes. Nevertheless, the initial decisions made during the restructuring proceedings hold significant weight, as they can determine the trajectory of the case. For instance, the decision on whether to accept or dismiss a restructuring filing is the first and one of the most crucial decisions in the proceedings. Therefore, even if the current judges are expected to make only a few early decisions before their term ends, their types can still significantly impact the outcomes of the cases.

4 Data

In this section, we describe the data used for our empirical analysis. To ensure consistency of the bankruptcy law and court system, we focus on the period from April 2006 to December 2015. This is because in April 2006, Korea implemented a new bankruptcy system that substantially changed the legal and institutional framework governing bankruptcy proceedings, and after 2015, the Korean bankruptcy court system underwent institutional changes.

Court Data We obtain bankruptcy filing data from the Court of Korea registry, which provides information on the year and type of the filing, the court where the case was filed, the case number, and the name of the filing firm.[23] To analyze the in-court process for each case, we use comprehen-

[23]The data is available at `http://www.iros.go.kr/PMainJ.jsp`.

sive data from the Court of Korea, which includes the filing date and court, case type, case number, name of the firm, court division and rank of the assigned judge, the date when the case ended, and detailed information on every step of the process, including the exact date for each step.[24] This allows us to observe all decisions made by each judge, including the time at which these decisions are made.

Table 2, Panel A, presents descriptive statistics on our legal data. In total, we use data from 4,688 restructuring cases during our sample period. The average case length is 19.39 months, with a median of 10 months. Over the course of our sample period, judges make 23,900 decisions that we classify as either debtor-friendly or creditor-friendly (see Section 5.1). Our data includes 327 judges who serve in a bankruptcy court for an average of 23.57 months. This implies that, on average, judges make just over 3 decisions that we classify as debtor-friendly or creditor-friendly per month on average.

Loan Data We combine data on loans from two different sources. First, we obtain monthly loan-level data from the Korea Information Service (KIS), which provides information on the borrower, lender, and loan amount. This data covers all firms in Korea and is available from December 2009. Each borrower and lender has a unique ID number, giving the data a panel structure. The data includes information on the city where a firm's principal operations are located, as well as basic accounting information such as total assets and sales. Second, we use annual loan data from Moon and Schoenherr (2022), who extract loan and interest rate information from firms' annual reports. Although this data has a lower frequency and less comprehensive coverage of firms compared to the monthly loan data from KIS, it provides information on interest rates. The data includes a firm's business ID number, which is an official ID number assigned to all firms in Korea.

Table 2, Panel B, provides descriptive statistics for the loan data.[25] The average loan size is 189 million KRW, and the average monthly firm-level loan volume is 1,326 million KRW. The average interest rate during our sample period is 4.17 percent.

[24] The data is available at `https://www.scourt.go.kr/portal/information/events/search/search.jsp`.

[25] Out of the total number of firms in the KIS data, interest coverage ratios can be computed for 125,663 firms, which we require for most of our empirical analysis.

Accounting Data We further obtain detailed accounting data from KIS. The data provides information on all balance sheet and income statement items, as well as two firm identifiers: an ID number used internally by KIS to identify firms, and an official business ID number assigned to every firm in Korea.

Table 2, Panel C, presents descriptive statistics for the accounting data. Accounting data is available for 337,484 firms. The average firm has 30 employees, with a median of 9 employees. The average firm has total assets of 9,567 million KRW, sales of 9,678 million KRW, an investment-to-asset ratio of 2.19 percent, a return on assets of 4.16 percent, and a leverage ratio of 47.49 percent.

Local GDP Data We obtain data on real local GDP from Statistics Korea. To compute GDP growth for each court zone, we match province-level and county-level GDP data with the 14 District Court zones.[26] We compute real GDP per capita for each court zone by dividing real GDP by the population of the respective court zone, which is also available from Statistics Korea.

Data Merging We match the restructuring filings and the data on case details using information on the court where the case was filed and a unique case number. This allows us to assign a precise date of filing to each restructuring case. Additionally, information on the court and the judges' ranks enables us to link judges to specific bankruptcy cases.

The monthly loan data provides information on the location of firms' headquarters, enabling us to assign firms to District Courts based on the court that has jurisdiction over their location. Since the monthly loan data is anonymized, we match it to the more comprehensive financial data using balance sheet and income statement items that are available in both databases. Specifically, we use time (year), total assets, and total cash and cash equivalents for matching. Since these variables jointly identify firms uniquely, we can match the data for all firms for which accounting data is available. Annual loan and interest rate data can be matched to the merged data using a unique business ID number that is assigned to all Korean firms and is available both in the annual

[26] Due to the unavailability of disaggregated county-level GDP data for Gyeonggi-do from 2005 to 2009, we apply the county weights from 2010 to decompose local GDP into the three District Court zones of Incheon, Suwon, and Uijeongbu for the period from 2005 to 2009.

accounting data and in the annual loan and interest rate data.

5 Empirical Strategy and Results

In this section, we provide an overview of our empirical methodology, including the measurement of courts' debtor-friendliness and legal uncertainty, the outline of our empirical strategy, and the presentation of the results derived from our analysis.

5.1 Measurement

We start by providing a description of how we classify judges' decisions as either debtor-friendly or creditor-friendly. Subsequently, we show how we utilize this data to generate monthly court-level measures of debtor-friendliness and legal uncertainty.

Judge Decisions We classify the decisions made by judges during critical stages of the restructuring process as either debtor-friendly or creditor-friendly. During our sample period, we identify a total of 23,900 decisions that can be categorized as debtor-friendly or creditor-friendly. A detailed list of these decisions can be found in Table 3.

The first decision in each restructuring case is whether the judge accepts or dismisses the case and potentially orders the firm to be liquidated. Restructuring offers firms the opportunity to overcome financial distress, thereby reducing the risk of complete loss for shareholders. Conversely, at the time of filing, most creditors typically favor liquidation as a preferred outcome (see, e.g., Bergström et al., 2002; Ayotte and Morrison, 2009; Vig, 2013).[27] Therefore, we classify the acceptance of a case as debtor-friendly, while the dismissal of a case is considered creditor-friendly.

During restructuring proceedings, the judge may side with the firm by preventing creditors from seizing the firm's assets, approving an extension of the period for the firm's management to propose a restructuring plan, or approving the proposed restructuring plan or its modifications. We

[27] Conflicts of interest may arise between secured and unsecured creditors concerning the liquidation of the firm. However, it is important to note that expectations regarding the court's debtor-friendliness can significantly influence the supply of secured credit, which serves as a crucial source of funding for the majority of firms.

classify these decisions as debtor-friendly. Conversely, if the judge's rulings favor the creditors by permitting the seizure of assets, denying an extension for the debtor's management to propose a restructuring plan, or rejecting the proposed restructuring plan or its modifications, we classify these decisions as creditor-friendly.

The judge also plays a pivotal role in determining when a firm is permitted to graduate from the restructuring proceedings. This decision carries substantial weight as the failure to implement the restructuring plan during the proceedings leads to mandatory liquidation. Conversely, when a firm is allowed to graduate from the proceedings, the threat of automatic liquidation is removed. Therefore, we classify this decision as debtor-friendly. In contrast, if the judge determines that a firm has failed to graduate from the restructuring proceedings, the firm is liquidated. As previously discussed, this decision is considered creditor-friendly due to the preference of secured creditors towards liquidation.

We deliberately abstain from assigning weights to different decisions based on their potential importance. The reason is that our objective is to assess what agents in the economy learn about a judge's type in terms of their debtor-friendliness rather than how a decision affects a particular case. Intuitively, even if a specific decision is less crucial for the outcome of a case, it still allows the agents to learn about the judge's type (Chang and Schoar, 2013).

Our primary objective is to estimate *perceived* judge types based on the information and technology available to firms and their creditors during the sample period, since judge types as perceived by debtors and creditors shape their expectations and decisions. Consequently, we classify all decisions without considering other case features. In principle, we could develop a model that incorporates firm characteristics, geographical factors, selection into in-court proceedings, and other relevant variables to extract the marginal effect of judges' preferences and characteristics on decisions. However, due to the challenges of obtaining such data in a timely manner during our sample period from 2006 to 2015, it is unlikely that firms and banks employed such an approach. While estimating actual judge types more precisely in hindsight may be possible with such an approach, it would not accurately capture the judge types as perceived by debtors and creditors at the time. In Section 6.1, we provide evidence supporting this assumption.

Judge Types and Learning To compute monthly court-level measures of perceived debtor-friendliness and legal uncertainty, we exploit two crucial aspects of Korea's legal and institutional environment. First, as discussed in Section 3, Korean judges undergo rotations across various courts and court divisions throughout their careers. In particular, judges are assigned to bankruptcy courts without prior experience in handling bankruptcy cases, and are replaced by other judges at the end of their term of two years. This implies that judges' types in terms of their debtor-friendliness are initially unknown. Therefore, debtors and creditors must rely on their prior beliefs during this stage. As time progresses, debtors and creditors gradually learn about judges' types by observing their decisions. The second crucial aspect is that, within a given court, bankruptcy cases are randomly assigned to judges. This random assignment generates assignment uncertainty, as discussed in Section 2.

To provide a theoretical foundation for our monthly court-level measures of debtor-friendliness and legal uncertainty, we extend our model of legal uncertainty with random judge assignment from Section 2.3.4 to incorporate agents' learning from judges' decisions. In this context, we refer to the supplier as the creditor and the producer as the debtor. Our objective is to develop a simple model that yields intuitive and robust formulas to plausibly capture the learning of agents in the economy.

To account for the binary nature of decisions in restructuring cases in our data, we assume that the debtor's share when assigned to judge $j \in J$, denoted by λ_j, follows a Bernoulli distribution. Thus, a judge's decision can either favor the creditor or the debtor. The probability of a debtor-friendly decision is denoted by q_j. Importantly, the probabilities q_j for all judges $j \in J$ are initially unknown to both the debtor and the creditor, and they hold homogeneous beliefs regarding their probability distributions.[28] In particular, this implies that $\mathbb{E}\left[\lambda_j\right] = \mathbb{E}\left[\mathbb{E}\left[\lambda_j \middle| q_j\right]\right] = \mathbb{E}\left[q_j\right]$.

To facilitate closed form solutions of the Bayesian updating formulas, we assume that agents' beliefs regarding q_j follow a beta distribution with parameters α and β. The agents' prior is characterized by a beta distribution with parameters α_0 and β_0. As agents observe the decisions of a judge over time, they update their beliefs using Bayes' rule.

Let N_j denote the number of decisions observed by agents for judge j up to a given month.

[28] In line with the notation from Section 2.3.4, we denote $\theta_j = q_j$.

Among these decisions, F_j represent the number of debtor-friendly decisions. We define $\bar{F}_j = \frac{F_j}{N_j}$. Consequently, the posterior distribution of q_j for judge j is given by a beta distribution with parameters $\alpha_j = \alpha_0 + F_j$ and $\beta_j = \beta_0 + N_j - F_j$. In particular, we can compute the expected value of q_j as follows

$$\mathbb{E}\left[q_j\right] = \frac{\alpha_j}{\alpha_j + \beta_j} = \frac{\alpha_0 + F_j}{\alpha_0 + \beta_0 + N_j} = \frac{\alpha_0 + \beta_0}{\alpha_0 + \beta_0 + N_j} \frac{\alpha_0}{\alpha_0 + \beta_0} + \frac{N_j}{\alpha_0 + \beta_0 + N_j} \bar{F}_j. \tag{3}$$

By using data on judges' decisions, we are able to compute the expected value $\mathbb{E}\left[q_j\right]$ for each judge j in every month, which we refer to as judges' perceived types.[29] To compute these measures, we calibrate the parameters of the prior distribution, α_0 and β_0, to match the distribution of judge types in our sample based on all decisions made by a judge, which we refer to as the fully-informed judge types. The average fully-informed judge type is 0.643, with a variance of 0.26. By calibrating the parameters α_0 and β_0 using the formulas for the mean and variance of a beta distribution, we determine that $\alpha_0 + \beta_0 = 7.834$, which we employ in our main analysis. Figure 3 depicts the histogram and calibrated beta distribution for our sample. We also investigate the robustness of our results with respect to the choice of α_0 and β_0 in Section 6.1.

The parameters α_0 and β_0 of the prior distribution have a straightforward interpretation. The selection of these values can be understood as treating the strength of agents' prior beliefs, which has a mean of $\frac{\alpha_0}{\alpha_0+\beta_0}$, as if it were based on observing $\alpha_0 + \beta_0$ observations. To illustrate, consider the scenario where agents hold prior beliefs given by $\alpha_0 = \beta_0 = 5$, and they observe five decisions of a judge, with one of them being debtor-friendly. Applying equation (3), this yields a posterior expectation of

$$\mathbb{E}\left[q_j\right] = \frac{5+1}{10+5} = \frac{10}{10+5}0.5 + \frac{5}{10+5}0.2 = 0.4.$$

If, instead, the prior belief is given by $\alpha_0 = \beta_0 = 10$, indicating an increased weight on the prior from ten to 20, then we obtain

$$\mathbb{E}\left[q_j\right] = \frac{10+1}{20+5} = \frac{20}{20+5}0.5 + \frac{5}{20+5}0.2 = 0.44.$$

[29] It is important to note that the Bayesian updating formula in equation (3) is conceptually identical to the case of a legal dispute involving a normally distributed transfer and an unknown mean. Consequently, our measures of judge types do not strictly depend on the assumption of a beta distribution.

Intuitively, assigning a higher weight to the prior reduces the rate at which agents in the economy update their beliefs based on information derived from observed judge decisions.

To assess whether our judge type measure captures persistent characteristics of judges, we examine whether we can predict judges' types based only on their decisions in the second half of their term, using their types based only on decisions in the first half of their term, by estimating

$$\mu_{j,t>T/2} = \alpha + \nu \cdot \mu_{j,t\leq T/2} + \varepsilon_j. \tag{4}$$

Here, $\mu_{j,t>T/2}$ represents the type of judge j based on their decisions in the second half of their term, while $\mu_{j,t\leq T/2}$ denotes their type based on their decisions in the first half of their term.

Table 4 presents the results. We find that a 10 percentage-point increase in debtor-friendly decisions during the first half of a judge's term corresponds to an 8.51 percentage-point increase in debtor-friendly decisions during the second half of the term (column I). The estimates remain consistent even after accounting for court fixed effects (column II) and court-cycle fixed effects (column III). This evidence strongly suggests that judge types capture persistent characteristics of individual judges that shape their decision-making.

Court-Level Measures We proceed by employing the monthly judge type measures to compute court-level measures of debtor-friendliness and legal uncertainty. First, we determine the expected value of the debtor's share in a legal dispute within a given court, where the judges are denoted as $j \in J$. This measure serves as a measure of the court's debtor-friendliness, which is defined as the average judge type within the court:

$$\mathbb{E}[\Lambda] = \frac{1}{J}\sum_{j\in J}\mathbb{E}\left[\lambda_j\right] = \frac{1}{J}\sum_{j\in J}\mathbb{E}\left[q_j\right]. \tag{5}$$

To compute this measure, we rely on our judge type measures, which serve as proxies for $\mathbb{E}\left[q_j\right]$. This approach allows us to directly quantify the level of debtor-friendliness within the court in every month.

Second, as discussed in Section 2.3.4, the variance of the debtor's share in a legal dispute,

denoted as $\text{Var}[\Lambda]$, serves as the measure of legal uncertainty in our model. One crucial component contributing to this variance is assignment uncertainty, which can be expressed as

$$\frac{1}{J}\sum_{j\in J}\left(\mathbb{E}\left[\lambda_j\right]-\frac{1}{J}\sum_{k\in J}\mathbb{E}\left[\lambda_k\right]\right)^2=\frac{1}{J}\sum_{j\in J}\left(\mathbb{E}\left[q_j\right]-\frac{1}{J}\sum_{k\in J}\mathbb{E}\left[q_k\right]\right)^2. \tag{6}$$

This measure quantifies assignment uncertainty and can be directly computed using the judge type measures.[30]

In addition to our proxy for assignment uncertainty, which captures idiosyncratic legal uncertainty, we develop two proxies of systematic legal uncertainty. First, as discussed in Section 2, if agents learn about the current legal regime from judges' decisions, legal uncertainty declines over time. The magnitude of this learning effect depends on how much agents learn over time. To capture this effect, we compute the average number of decisions made by the judges in a given court up to a given month. This measure serves as a proxy for type uncertainty, reflecting the learning process and its impact on legal uncertainty. Second, as the replacement of judges in a given court draws closer, legal uncertainty increases as agents put more weight on the future legal regime with new judges, about which they have less information. To capture this time-varying effect of regime uncertainty at the court level, we compute the fraction of judges' term completed up to a given month.[31]

5.2 Empirical Predictions

In this section, we summarize the empirical predictions based on our theoretical framework regarding our monthly court-level measures of debtor-friendliness and legal uncertainty.

First, our model predicts that an increase in assignment uncertainty, as defined in equation (6), has a negative impact on credit demand and supply, leading to a negative effect on borrowing and

[30] Decision uncertainty, in contrast, cannot be measured in a straightforward way in our setting and we therefore cannot use it in our empirical analysis.

[31] It is important to note that in our specific setting, the measure of type uncertainty based on the number of observed decisions in a given court exhibits less aggregate variation compared to the measure of regime uncertainty based on the fraction of judges' term that is completed. At any given point in time, there is more variation in the number of judge decisions across courts, whereas judge replacement cycles are strongly correlated across courts.

investment. We classify assignment uncertainty as a form of idiosyncratic legal uncertainty, as lenders who provide loans to multiple firms and encounter various bankruptcy cases within the same court or across different courts can mitigate the risk through diversification. Consequently, a more diversified creditor is expected to be less affected by assignment uncertainty. As a result, credit supply should be relatively less responsive to assignment uncertainty compared to systematic sources of legal uncertainty. Conversely, undiversified debtors are equally exposed to both assignment uncertainty and systematic sources of legal uncertainty, such as type and regime uncertainty.

Second, according to our model, an increase in the average number of decisions made by judges in a given court, indicating lower type uncertainty, leads to a reduction in legal uncertainty. We classify type uncertainty as a form of systematic legal uncertainty, as all bankruptcy cases handled by a given court are systematically affected by this type of uncertainty about judge types. Consequently, a reduction in type uncertainty should increase both the demand for and the supply of credit.

Third, our model predicts that an increase in the fraction of judges' term at a court, indicating higher regime uncertainty, exerts a negative impact on borrowing and investment. As discussed in Section 2.3.3, as the replacement of judges draws closer, debtors and creditors become more exposed to the new legal regime. As agents possess more information about the legal regime under current judges compared to the future legal regime, this effect increases legal uncertainty. We classify regime uncertainty as a form of systematic legal uncertainty since it systematically affects all bankruptcy cases handled by a particular court.

Fourth, the empirical prediction regarding the impact of courts' debtor-friendliness, as presented in equation (5), on borrowing and investment is ambiguous. As demonstrated in Section 2, credit demand depends positively on the expectation of the debtor's share in a legal dispute, whereas credit supply depends negatively on the debtor's share. In our model, the opposing demand and supply effects offset each other. In a more general model that incorporates downward-sloping aggregate demand or additional frictions, either the demand or supply effect may dominate (see, e.g., Schoenherr and Starmans, 2022). Thus, whether the demand or supply effect dominates in our setting is an empirical question.

5.3 Empirical Analysis

In our empirical analysis, we test the model's empirical predictions by using the monthly court-level measures of debtor-friendliness, assignment uncertainty, type uncertainty, and regime uncertainty.

5.3.1 Legal Uncertainty and Restructuring Filings

We begin our analysis by providing direct evidence on the impact of courts' debtor-friendliness and legal uncertainty on firms' filing decisions. Building upon previous research on bankruptcy forum shopping (see, e.g., Ayotte and Skeel, 2004; Ellias, 2018), we examine whether variation in restructuring filings across different courts can be predicted by our measures of debtor-friendliness and legal uncertainty by estimating

$$F_{c,t} = \alpha_c + \alpha_t + \delta \cdot \mu_{c,t-1} + \theta_1 \cdot \sigma_{c,t-1} + \theta_2 \cdot N_{c,t-1} + \theta_3 \cdot \tau_{c,t-1} + \varepsilon_{c,t}, \tag{7}$$

where $F_{c,t}$ denotes the number of restructuring filings in court c in month t. The variable $\mu_{c,t-1}$ denotes court c's debtor-friendliness at the end of month $t-1$, as defined in equation (5). $\sigma_{c,t-1}$ denotes the level of assignment uncertainty at court c at the end of month $t-1$, defined as the square root of the variance in equation (6).[32] $N_{c,t-1}$ captures type uncertainty, measured by the average number of decision made by judges at court c at the end of month $t-1$, in units of 100 decisions (e.g., for ten decisions, $N_{c,t-1}$ is 0.1). Lastly, $\tau_{c,t-1}$ denotes regime uncertainty, measured by the fraction of judges' term at court c completed at the end of month $t-1$. For example, if judges' term at a given court is 24 months, $\tau_{c,t-1}$ takes the value of 0.25 after 6 months. To control for time-invariant court-specific differences in filing levels and for time-series shocks, we include court fixed effects (α_c) and month fixed effects (α_t). In some specifications, we replace time fixed effects with court zone-time fixed effects ($\alpha_{z,t}$), which implies that we compare filings in adjacent courts belonging to the same court zone, as outlined in Section 3.1. Furthermore, to account for unobservable court-specific trends that affect filing rates, we incorporate the number of judges

[32] We use the standard deviation instead of the variance for ease of interpretation, as it shares the same unit as our debtor-friendliness measure. Using the variance yields qualitatively identical results.

appointed to the bankruptcy court at the beginning of a term as a control variable, which reflects the court's expectations regarding filing rates in the upcoming term.

If our measures of debtor-friendliness and legal uncertainty capture relevant information, we would expect them to have predictive power for restructuring filings across courts over time. Specifically, we anticipate that a court's higher level of debtor-friendliness and lower degree of legal uncertainty would be associated with a greater likelihood of firms filing for restructuring. Consequently, we predict δ to be positive, indicating a positive relationship between debtor-friendliness and restructuring filings. Further, we expect a negative value for θ_1, reflecting a negative relationship between assignment uncertainty and restructuring filings. Additionally, we anticipate a negative relationship between type uncertainty and restructuring filing, which would result in a positive value for θ_2. The prediction for θ_3 in the context of restructuring filings is ambiguous. On the one hand, a higher level of regime uncertainty implies that a larger portion of a new case would be handled by new judges. On the other hand, firms may have an incentive to accelerate their filing decisions before the end of judges' term to ensure that the current judges are in charge of crucial early decisions, such as accepting the case.

The results from estimating equation (7) are reported in Table 5. In columns I and II, we find that a higher level of courts' debtor-friendliness is associated with more monthly restructuring filings. Conversely, higher assignment uncertainty is associated with fewer filings. While the effect of type uncertainty on filing rates is not statistically significant, we observe a positive effect for regime uncertainty. Specifically, in the more stringent test with court-zone fixed effects (column II), a 10 percentage-point increase in courts' debtor-friendliness leads to a 0.80 increase in filings, and completing half of the judges' term results in an increases by 0.77 filings. Conversely, a 10 percentage-point increase in assignment uncertainty is associated with a reduction of 0.95 filings. Although we consistently observe a negative effect of type uncertainty on filing rates, the estimates are noisier and not statistically significant.

In the most stringent test in column III, we restrict our sample to firms located in areas where they have the option to choose between two courts when filing: the local District Court and the District Court in the city with the High Court that covers their region. This design keeps the firm including its geographic location and economic conditions constant. This eliminates concerns

about differences in filing rates across courts being driven by differences in economic conditions. Consistent with the previous results, we find that the number of filings is higher when courts are more debtor-friendly, whereas assignment uncertainty is associated with fewer filings. For this sample, we find that regime uncertainty no longer affects filing rates.

Comparing the results in columns II and III highlights that filing rates are influenced by two factors: firms' choices of where to file, conditional on having a choice (column III), and the decision whether or not to file in the first place. If differences in filing rates were solely driven by firms that have the option to choose between two courts, the estimates in columns II and III would be similar in magnitude. However, we observe that the magnitudes in column II, which includes firms that cannot choose between two courts, are approximately twice as large as those in column III. This implies that courts' debtor-friendliness and assignment uncertainty not only impact where firms choose to file, but also play a role in determining whether or not firms file for restructuring in the first place.

5.3.2 Legal Uncertainty and Credit Markets

We proceed by examining the impact of courts' debtor-friendliness and legal uncertainty on credit markets, by estimating

$$\log(L_{ib,t}) = \alpha_i + \alpha_b + \alpha_{z,t} + \delta \cdot \mu_{c,t-1} + \theta_1 \cdot \sigma_{c,t-1} + \theta_2 \cdot N_{c,t-1} + \theta_3 \cdot \tau_{c,t-1} + \varepsilon_{ib,t}, \qquad (8)$$

where $\log(L_{ib,t})$ represents the logarithm of total loan volume from bank b to firm i in month t. As discussed in Section 3, some firms have the option to choose between two courts when filing for restructuring. In line with the findings from Section 5.3.1, which indicate that firms tend to choose the more debtor-friendly court when filing for restructuring, we assign the debtor-friendliness and uncertainty measures from the more debtor-friendly court to firms that have the choice between courts.[33] To control for time-invariant firm- and bank-specific differences in loan volume, we incorporate firm fixed effects (α_i) and bank fixed effects (α_b). Furthermore, court zone-month fixed effects ($\alpha_{z,t}$) control for time trends specific to a court zone. Based on the

[33] In Section 6.1, we show that the results are qualitatively identical when we limit the sample to firms that cannot choose between two courts.

empirical predictions from the model, we anticipate a negative value for θ_1, reflecting a negative relationship between assignment uncertainty and loan volume. Moreover, we expect a negative relationship between type uncertainty and loan volume, resulting in a positive value for θ_2. Lastly, we anticipate a negative relationship between regime uncertainty and loan volume, leading to a negative value for θ_3. The prediction for δ is ambiguous, reflecting the fact that the relationship between debtor-friendliness and loan volume is unclear due to the opposing effects from both the demand and supply sides.

The results are reported in Table 6, column I, and suggest that assignment uncertainty has a negative effect on loan volume. Specifically, a 10 percentage-point increase in assignment uncertainty leads to a decrease in loan volume by 0.70 percent for the average firm-bank relationship. Similarly, higher levels of type uncertainty negatively impact loan volume. Specifically, observing 100 fewer observations per judge results in a reduction in loan volume by 1.27 percent. Furthermore, higher levels of regime uncertainty are associated with lower loan volume. Specifically, completing half of the judges' term, which roughly corresponds to one year on average, leads to a decrease in loan volume by 0.44 percent for the average firm-bank relationship. Finally, we find that loan volume is higher under more debtor-friendly courts. Specifically, a 10 percentage-point increase in debtor-friendliness is associated with an increase in loan volume by 1.61 percent for the average firm-bank relationship.

Firm Risk To sharpen the interpretation of the results, we estimate equation (8) separately for firms with different exposure to bankruptcy courts.[34] Specifically, we divide firms into three groups: high-risk firms with an interest coverage ratio below two, medium-risk firms with an interest coverage ratio between two and five, and low-risk firms with an interest coverage ratio above five.[35] We find that the negative relationship between legal uncertainty and loan volume is mostly driven by the high-risk firms (Table 6, column II). For high-risk firms, a 10 percentage-point increase in assignment uncertainty leads to a decrease in loan volume by 1.56 percent per firm-bank

[34] This augmentation aligns with our model extension outlined in Appendix A.2, where we allow the probability of a legal dispute to be smaller than one.

[35] An interest coverage ratio below two corresponds to a credit rating of B- or worse, while an interest coverage ratio above five translates into a credit rating of A- or better (see `https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ratings.htm`).

relationship. The effects are economically and statistically weaker for medium-risk firms (column III) and low-risk firms (column IV).

Similarly, the effect of type uncertainty on loan volume is less pronounced and insignificant for low-risk firms. More information about current judges increases loan volume by 3.22 percent per 100 decisions for high-risk firms, whereas the effect is only 1.28 percent for medium-risk firms and insignificant for low-risk firms, respectively. Additionally, the results reveal variations in the impact of regime uncertainty across risk groups. Completing half of the current judges' term has a negative effect on loan volume for high-risk firms, reducing it by 1.72 percent. However, this effect is not statistically significant for medium-risk and low-risk firms. Finally, the effect of courts' debtor-friendliness on loan volume differs across risk categories. A 10 percentage-point increase in courts' debtor-friendliness leads to an increase in loan volume by 5.93 percent per firm-bank relationship for high-risk firms, whereas the effect is statistically insignificant for medium-risk and low-risk firms.

Firm-level Aggregation To capture changes in firm-level borrowing, we aggregate total loan volume at the firm level and estimate

$$\log(L_{i,t}) = \alpha_i + \alpha_{z,t} + \delta \cdot \mu_{c,t-1} + \theta_1 \cdot \sigma_{c,t-1} + \theta_2 \cdot N_{c,t-1} + \theta_3 \cdot \tau_{c,t-1} + \varepsilon_{i,t}, \tag{9}$$

where $\log(L_{i,t})$ represents the logarithm of firm i's total loan volume in month t. The remaining variables, including $\mu_{c,t-1}$, $\sigma_{c,t-1}$, $N_{c,t-1}$, and $\tau_{c,t-1}$, are defined as before.

The results are reported in Table 7. In column I, we find that an increase in assignment uncertainty is associated with a decrease in loan volume, with a reduction of 0.63 percent per 10 percentage-point increase in assignment uncertainty. Additionally, having an additional 100 observations per judge leads to an increase in loan volume by 0.79 percent. Completing half of current judges' term is associated with a decrease in loan volume by 1.31 percent. Furthermore, for the average firm, a 10 percentage-point increase in courts' debtor-friendliness leads to a 2.01 percent increase loan volume.

In columns II to IV, we split firms based on their risk levels: high-risk firms (column II),

medium-risk firms (column III), and low-risk firms (column IV). Consistent with the previous results, we find that the adverse effects of legal uncertainty are predominantly concentrated in high-risk firms. Specifically, for high-risk firms, a 10 percentage-point increase in assignment uncertainty leads to a reduction in loan volume by 2.07 percent. Having an additional 100 observations per judge is associated with an increase in loan volume by 4.32 percent. Completing half of current judges' term results in a decrease in loan volume by 3.05 percent. Moreover, a 10 percentage-point increase in courts' debtor-friendliness leads to an increase in loan volume by 9.14 percent.

Credit Demand and Supply The results from estimating equations (8) and (9) capture both the demand and supply responses to legal uncertainty and debtor-friendliness. To assess the relative importance of these demand and supply effects, we examine interest rates. Since interest rate data is only available at an annual frequency, we collapse the data at the annual level. Specifically, we estimate

$$R_{i,t} = \alpha_i + \alpha_b + \alpha_{z,t} + \delta \cdot \overline{\mu}_{c,t} + \theta_1 \cdot \overline{\sigma}_{c,t} + \theta_2 \cdot \overline{N}_{c,t} + \theta_3 \cdot \overline{\tau}_{c,t} + \varepsilon_{i,t}, \tag{10}$$

where $R_{i,t}$ represents the average interest rate on loans to firm i in year t. The remaining variables, including $\overline{\mu}_{c,t}$, $\overline{\sigma}_{c,t}$, $\overline{N}_{c,t}$, and $\overline{\tau}_{c,t}$, are the annual averages of the monthly measures of debtor-friendliness, assignment uncertainty, type uncertainty, and regime uncertainty, respectively.

The empirical predictions from the model imply the following relationships. First, we expect a positive value for δ since a higher level of debtor-friendliness increases credit demand but reduces credit supply, both of which contribute to an increase in interest rates. Second, the prediction for θ_1 is negative, as credit demand is more sensitive to idiosyncratic legal uncertainty compared to credit supply. As for θ_2 and θ_3, the predictions are ambiguous because an increase in systematic sources of legal uncertainty has a negative impact on both credit supply and credit demand. This is because the coefficients θ_2 and θ_3 not only capture the negative demand effect, as is the case for θ_1, which reduces interest rates, but also capture a negative supply effect, which increases interest rates.

The results are reported in Table 8. We find that interest rates are higher when courts are more debtor-friendly, as shown in column I. This effect is driven by high-risk firms, as demonstrated

in column II. For high-risk firms, a 10 percentage-point increase in courts' debtor-friendliness leads to an increase in interest rates by 21 basis points. This finding aligns with our theoretical expectations, as the prediction for δ in the context of interest rates is unambiguous.

In addition, we find that higher assignment uncertainty is associated with lower interest rates for high-risk firms as shown in column II. Specifically, a 10 percentage-point increase in assignment uncertainty leads to a reduction in interest rates by 3 basis points. This combination of lower loan quantities and lower interest rates is indicative of the negative relationship between assignment uncertainty and loan volume being primarily driven by lower demand for credit.

In contrast, higher levels of type and regime uncertainty are associated with higher interest rates. Specifically, observing 100 fewer decisions per judge results in a 28 basis point increase in interest rates for high-risk firms. Completing half of current judges' term leads to a 13 basis point increase in interest rates for high-risk firms. This suggests that systematic legal uncertainty, as captured by the amount of information available about current judges and the completion of their terms, has a relatively more significant impact on credit supply. This result suggests that in our setting banks are more sensitive to systematic sources of legal uncertainty compared to firms. For example, this could be the case because banks are more aware of systematic legal uncertainty across courts or regulatory constraints may amplify the effect of systematic legal uncertainty on bank lending decisions.

5.3.3 Legal Uncertainty and Firm Investment

Finally, we investigate whether the effects of courts' debtor-friendliness and legal uncertainty extend to investment decisions by replacing the dependent variable in equation (10) with firm investment, denoted as $I_{i,t}$. Specifically, firm investment is defined as the change in fixed assets from year $t-1$ to year t, scaled by total assets in year $t-1$.

The results are reported in Table 9. We find that greater assignment uncertainty has a negative impact on investment, as shown in column I. This effect is driven by high-risk firms, as demonstrated in column II. Specifically, a 10 percentage-point increase in assignment uncertainty leads to a reduction in investment by 0.08 percentage points for the average firm, and by 0.22 percent-

age points for high-risk firms. Moreover, we find that having additional information about current judges has a positive effect on investment for high-risk firms. Specifically, an increase by 100 observations of current judges' decisions results in an increase in investment by 2.43 percent for high-risk firms. Completing half of current judges' term is associated with a decrease in investment by 0.35 percentage points for high-risk firms. Consistent with the results on loan volume, for high-risk firms, we find that investment increases by 0.61 percentage points per 10 percentage-point increase in courts' debtor-friendliness.

6 Alternative Interpretations and Robustness Tests

In this section, we discuss alternative interpretations of the results and provide additional empirical analysis to reinforce and validate our interpretation of the results.

6.1 Agents' Prior and Learning

To begin with, we assess the sensitivity of the results to assumptions about the learning model and agents' prior beliefs.

Strength of Agents' Prior First, we assess the sensitivity of our results to the strength of agents' prior by varying the parameters α_0 and β_0 in the beta distribution. These parameters determine the weight assigned to the prior information in agents' beliefs about judge types in the economy. In our baseline calibration, we set $\alpha_0 + \beta_0 = 7.834$, which corresponds to treating the prior as if it is based on observing 7.834 judge decisions.

In Table 10, we assess the implications of different choices of $\alpha_0 + \beta_0$. In Panel A, we reduce the weight assigned to the prior by setting $\alpha_0 + \beta_0 = 5$. In Panel B, we increase the weight assigned to the prior by setting $\alpha_0 + \beta_0 = 10$. We find qualitatively identical results with similar magnitudes in both panels compared with the main results in Table 6. This suggests that the results are not highly sensitive to the strength of agents' prior.

Informed Priors and Alternative Learning Models We assume that firms and banks start with the same prior for all judges at the beginning of their term. However, judges types may be predictable based on judges' characteristics or expectations about economic conditions in ways that we are not able to observe.

To formally test whether firms and banks use more informed priors, we include measures of courts' debtor-friendliness ($\hat{\mu}_{c,t}$) and assignment uncertainty ($\hat{\sigma}_{c,t}$) based on all judge decisions during their term in equation (8). These measures, referred to as fully-informed judge types, incorporate all available information about judges and provide the most precise estimates of judge types. If firms or banks possess a superior ability to anticipate judges' decisions, the fully-informed judge types should have additional predictive power for credit outcomes.

The results in Table 11 suggest that there is no clear evidence that firms' and banks' decisions reflect more informed priors. While there are some significant estimates for the fully-informed debtor-friendliness measure for the riskiest and safest firms in columns II and IV, these estimates point in opposite directions and do not support the notion that firms and banks possess superior information about judges. For high-risk firms, we observe a small effect for assignment risk based on fully-informed types in column II. However, the magnitude of the effect is significantly smaller than the main assignment risk effect and is of opposite sign.

These results also provide evidence that firms and banks do not use a more sophisticated model to predict judge types. If they were using a more advanced model, we would expect the court-level measures based on fully-informed judge types to have some predictive power, as these measures would converge more rapidly to the true judge types. However, the fact that the measures based on fully-informed judge types do not independently predict loan volume suggests that firms and banks are not employing a superior model to predict judge types.

Court Choice In our analysis, we assume that firms that have the option to choose between two courts will select the more debtor-friendly court. While this assumption simplifies the analysis, the results presented in Table 5 indicate that firms also consider the level of legal uncertainty when making decisions about which court to file for restructuring. In addition, debtor-friendliness and legal uncertainty influence the probability of whether a firm decides to file for restructuring

in the first place. Consequently, estimating a model that incorporates both debtor-friendliness and assignment uncertainty to assign firms to a specific court is a complex problem that lacks a straightforward solution.

To assess the impact of the option to choose between two courts on our estimates, we limit our analysis to firms that do not have the choice between two courts. Each court zone contains only a single court where firms do not have the option to choose between two courts (the District Court in a city with a High Court). As a result, court zone-month fixed effects would absorb the variation in court-level measures. Therefore, we replace court zone-month fixed effects with month fixed effects to control for time-specific factors.

The results are presented in Table 12. In column I, we estimate the regression from Table 6, column I, with month fixed effects instead of court zone-month fixed effects to allow for a comparison of the results. We find that the results in columns II to V, which are based on firms that do not have the option to choose between two courts, are qualitatively identical to the main sample results and exhibit similar magnitudes. This suggests that our definition of the relevant court for a given firm does not have a significant impact on the results.

6.2 Macroeconomic Shocks

Next, we assess whether our measures of legal uncertainty and debtor-friendliness are correlated with macroeconomic shocks, in which case economic conditions may constitute a confounding factor biasing our estimates, a concern that applies to many other measures of uncertainty (see, e.g., Bloom, 2014).

Macro-economic Conditions and Legal Uncertainty While judge rotations in Korea adhere to institutional rules that are orthogonal to economic considerations, judges' decisions and their dispersion may be influenced by macro-economic conditions. For instance, during economic booms, judges may exhibit greater optimism regarding the prospects of distressed firms, resulting in more favorable rulings and lower variability in their decisions. Consequently, judges could appear more debtor-friendly, and assignment uncertainty may decrease precisely when economic conditions are

more favorable. Given that favorable economic conditions also tend to stimulate credit demand and supply, a correlation between economic conditions and the debtor-friendliness of courts, as well as assignment uncertainty, could drive a positive relationship between courts' debtor-friendliness and loan volume, and a negative relationship between assignment uncertainty and loan volume.

To examine the relationship between our measures and economic conditions, we calculate correlations between local GDP growth and our measures. We aggregate city- and county-level GDP measures at the court-district level to compute court-specific measures of GDP growth. We find weak and insignificant correlations between local economic growth and our measures. Specifically, the correlation between economic growth and debtor-friendliness is 0.05 with a p-value of 0.586, the correlation between type uncertainty and economic growth is -0.18 with a p-value of 0.042, the correlation between economic growth and assignment uncertainty is -0.08 with a p-value of 0.370, and the correlation between regime uncertainty and economic growth is 0.09 with a p-value of 0.310. These findings suggest that our measures are not related to economic conditions, supporting the notion that our results are not driven by macroeconomic shocks.[36]

Industry-Level Shocks and Legal Uncertainty To address the potential influence of industry-specific shocks on our estimates, we incorporate industry-time fixed effects into equation (8). The results are reported in Table 13. We find that adding industry-month fixed effects does not alter the qualitative findings and maintains similar economic magnitudes.

6.3 Remaining Concerns

Finally, we address remaining concerns regarding the interpretation of the results that are not related to assumptions about creditors' and debtors' learning or macroeconomic shocks.

Bank Quality Differences in bank quality across courts could potentially influence case outcomes and loan volume, leading to a correlation between courts' debtor-friendliness or legal uncertainty with loan volume. For example, lower bank quality might result in smaller credit markets

[36]For type uncertainty, the p-value is below 5 percent. However, if anything, the negative correlation would imply a negative association between the number of observations per judge and loan volume, which is the opposite of what we find.

and more unpredictable outcomes in restructuring cases. To mitigate concerns about differences in bank quality affecting the results, we saturate equation (8) by adding bank-month fixed effects. This approach leverages the fact that the same bank lends to firms assigned to different courts, effectively holding bank quality constant by comparing firms assigned to different courts but borrowing from the same bank. The results are reported in Table 14. We find that the results are qualitatively unaffected and quantitatively similar after controlling for bank-month fixed effects. This suggests that differences in bank quality across courts do not affect the results.

Endogenous Judge Allocation to Courts While the rules governing the allocation of judges to different courts and divisions are orthogonal to economic considerations, it is possible that informal rules or preferences in the appointment process could introduce a correlation between judge types, legal uncertainty, and loan levels. For instance, if younger judges are more likely to be assigned to courts in economically prosperous regions, and if younger judges also tend to be more debtor-friendly and exhibit greater decision uniformity, it could create a scenario where higher loan volume is associated with higher debtor-friendliness or lower assignment uncertainty due to the judge allocation process.

Two findings from our analysis provide evidence against the presence of systematic and endogenous allocation of judges that could explain our results. First, if there was a systematic allocation of judges based on characteristics such as age or experience, we would expect banks and firms to be able to predict judge types and adjust their expectations accordingly. However, the results in Table 11 indicate that firms and banks do not possess superior predictive abilities compared to our model. Second, as detailed in Section 6.2, our analysis does not reveal any correlation between courts' debtor-friendliness or legal uncertainty and the business cycle. The absence of such correlation further supports the notion that endogenous judge appointments do not generate a systematic relationship between our measures of debtor-friendliness and legal uncertainty and loan volume.

Judge Learning Bankruptcy judges are appointed without prior exposure to bankruptcy cases, which raises the possibility that they may improve their decision-making abilities over time as they gain experience in handling bankruptcy cases. In this case, judges may exhibit lower decision quality and greater inconsistency at the beginning of their term, which may lead to higher assignment

uncertainty and may negatively impact credit markets.

To assess whether this is the case, we examine whether there are systematic trends in the time series evolution in the average debtor-friendliness and average assignment uncertainty over the duration of judges' terms, as depicted in Figure 4. We find that on aggregate there is a remarkable stability in the level of debtor-friendliness and assignment uncertainty over the course of judges' terms. Thus, it appears that there is no discernible correlation between learning on the job and the courts' average debtor-friendliness or average assignment uncertainty.

Judge Quality Judge quality may exhibit heterogeneity that could potentially correlate with our measures of judge types and legal uncertainty. For instance, highly skilled judges who are more effective at handling bankruptcy proceedings may also render more consistent decisions. Consequently, our measure of assignment uncertainty may be confounded by the underlying quality of judges. In other words, it may be difficult to disentangle the effects of judge types and legal uncertainty from those of judge quality.

Assessing the quality of judges in bankruptcy cases is a challenging task. One commonly used measure of efficiency in bankruptcy cases is the duration it takes to resolve them. Our analysis of the data indicates that there is virtually no correlation between judge types or assignment uncertainty and the length of a case. Specifically, the correlations between judges' debtor-friendliness and case length, as well as assignment uncertainty and case length, are both only 0.09. These results suggest that our measures at most show a very weak correlation, if any, with judge quality.

Furthermore, as previously discussed, the evidence presented in Figure 4 supports the notion that, on average, judges' debtor-friendliness and assignment uncertainty exhibit minimal variation throughout judges' terms. This observation suggests that these measures remain largely unaffected by any improvements in judge quality that could arise from learning over time.

Large Firms The composition of our sample primarily consists of small and medium-sized firms. Large firms are sometimes considered to have some flexibility in engaging in forum shopping or that there could be non-random elements in the assignment of their cases to judges (Hüther and Kleiner, 2022). While there is no hard evidence on such effects in the context of Korea, to

address such concern, we re-estimate our main analysis excluding firms with assets of 10 billion KRW or higher. The results are presented in Table 15. We find that the results remain qualitatively unchanged when considering only firms with assets below 10 billion KRW and the magnitudes of the effects are very similar to those obtained in our original analysis including all firms. This indicates that the inclusion of large firms does not significantly affect our results.

7 Discussion and Implications

In this section, we discuss the economic and legal implications of our analysis. While we primarily emphasize the positive impact of reducing legal uncertainty on credit markets and economic activity, it is important to acknowledge that policies aimed at reducing legal uncertainty may also entail negative consequences. These potential downsides should be carefully considered during the policy design process.

Judicial System There are various approaches to reducing legal uncertainty through reform of the judicial system. Given that judges' decision-making may be subject to biases (see, e.g., Frank, 1931), the random assignment of cases to individual judges serves to enhance fairness and instill confidence in judicial processes (see, e.g., Shayo and Zussman, 2011; Abrams et al., 2012). Our analysis draws attention to a potential drawback associated with random judge assignments, namely assignment uncertainty. Since assignment uncertainty can be mitigated through diversification, the cost of random judge assignment is reduced when plaintiffs and defendants have the ability to diversify this particular form of uncertainty.

In contrast to a judicial system where judges specialize and remain in the same court for extended periods, implementing regular rotations of judges across different courts and divisions can have certain advantages. Rotations can broaden judges' expertise by exposing them to diverse areas of law and help mitigate the risk of cronyism. However, it is important to note that frequent changes in judicial appointments also give rise to increased type and regime uncertainty. Unlike other forms of uncertainty, regime and type uncertainty are challenging to diversify, and consequently impact a broader set of plaintiffs and defendants.

Legal System There is a significant body of literature that examines the economic implications of legal systems, particularly legal origins (see, e.g., La Porta et al., 1998; La Porta et al., 1999; Djankov et al., 2007). Our analysis contributes to this field by highlighting the potential implications of legal traditions on legal uncertainty. For instance, within the common law system, a stronger adherence to precedent has a dual effect on legal uncertainty. While it can decrease legal uncertainty by enhancing predictability of future decisions, it also implies that individual decisions may systematically influence legal disputes going forward, thereby making legal uncertainty more systematic and difficult to diversify. In contrast, in a civil law system, individual decisions by judges have less influence on legal disputes going forward.

Legislation Reducing the frequency and magnitude of legislative changes can effectively mitigate regime uncertainty, which represents a form of systematic legal uncertainty that cannot be diversified. Several approaches can be employed to achieve this objective. Firstly, extending the duration of election cycles can help minimize the disruptions caused by frequent changes in legislation. Additionally, political systems that incorporate a greater number of checks and balances contribute to stability and reduce regime uncertainty. Parliamentary rules and systems that foster consensus, such as filibuster rules and multiple-party systems, can also play a role in curtailing drastic changes in legislation and promoting a more stable legal regime.

Transparency and Predictability In recent years, a lively debate has emerged among academics, industry practitioners, and policymakers regarding the predictability of judge assignments and decisions (see, e.g., Hüther and Kleiner, 2022).[37] Our analysis sheds light on a trade-off that arises when considering the advantages of establishing predictable patterns in the judicial process at both the institutional level (case assignments to judges) and the individual judge level, and the concerns related to data protection, privacy, fairness, and equity. Specifically, increased transparency of legal proceedings and decisions can enable market participants to make more accurate predictions about legal outcomes, thereby reducing both idiosyncratic and systematic legal uncertainty. In particular, the use of algorithmic recommendations may be able to reduce noise arising

[37]For the recent debate on the use of judicial analytics see, for example, "Big Data: Legal Firms Play 'Moneyball'," Financial Times, February 6, 2019, and "France's Judicial Analytics Ban Unlikely to Catch On in U.S.," Bloomberg Law, June 5, 2019.

from judicial discretion (see, e.g., Kleinberg et al., 2017; Angelova et al., 2022). However, it is important to carefully balance this transparency with considerations of data protection, privacy rights, and ensuring a fair and equitable legal system.

Firm Boundaries Our analysis offers broader implications for the boundaries of firms. Legal disputes and legal uncertainty often arise when two parties enter a contract. Transactions that occur within the boundaries of a firm are typically less susceptible to contractual incompleteness. Consequently, one strategy to mitigate the impact of legal uncertainty is to consolidate transactions within the firm through vertical or horizontal integration.

Furthermore, vertical or horizontal integration enables firms to achieve economies of scale and expand their size by diversifying their business relationships. This diversification allows firms to reduce their exposure to idiosyncratic legal uncertainty, providing an additional rationale for pursuing mergers and acquisitions.

Intermediation Similar to other forms of idiosyncratic uncertainty, idiosyncratic legal uncertainty can be diversified by large institutions, including conglomerates, insurance companies, or banks. For instance, in the context of bankruptcy law, specialized firms such as hedge funds play a crucial role. These firms acquire and consolidate distressed debt (see, e.g., Jiang et al., 2012; Lim, 2015; Ivashina et al., 2016), effectively serving as intermediaries that diversify legal uncertainty.

In the legal industry, it is common for law firms to structure their compensation arrangements based on a percentage of the proceeds obtained from a case, rather than charging a flat fee. This payment structure helps align the incentives of the law firm with those of their clients. Importantly, this payment arrangement also serves to reduce the exposure of clients to legal uncertainty. By tying their fees to the success of a case, law firms essentially take on and diversify some of the idiosyncratic legal uncertainty associated with the outcome.

Other institutions also possess the capability to effectively diversify legal uncertainty. An illustrative example is the emergence of litigation funding in recent years, enabling the financing of lawsuits by third parties like investment funds (see, e.g., Martin, 2004). By providing funding for a portfolio of lawsuits, investment funds can effectively diversify legal uncertainty. Moreover, a

dedicated market for insurance has developed to address variations in the outcomes of legal cases, thereby absorbing idiosyncratic legal uncertainty. Insurance companies offer a range of products that cater to different aspects of legal uncertainty, including traditional legal insurance as well as newer forms like litigation risk insurance. These insurance products enable individuals, businesses, and institutions to transfer the potential financial risks associated with legal uncertainties to insurance providers.

8 Concluding Remarks

In this paper, we examine the impact of legal uncertainty on credit markets and economic activity. Our model demonstrates that legal uncertainty has a detrimental effect on economic activity. Furthermore, we distinguish between two types of legal uncertainty: idiosyncratic and diversifiable sources, as well as systematic and nondiversifiable sources. To validate the predictions of our model, we employ micro-level data on bankruptcy judges, bankruptcy cases, and corporate loans from Korea. Our empirical findings support the predictions made by the model, reinforcing the notion that legal uncertainty has significant implications for economic outcomes.

We view our paper as an initial step towards understanding the implications of legal uncertainty for economic outcomes. Despite the simplicity of our model, it holds significant economic and policy implications. This suggests that delving further into the economic consequences of legal uncertainty has the potential to yield novel insights and policy implications. One promising avenue for future research is to explore how individuals and firms mitigate their exposure to legal uncertainty. Additionally, while our study focuses on legal uncertainty in the context of bankruptcy law to analyze its effects on economic activity, it is important to acknowledge that legal uncertainty permeates various areas of the law, impacting a wide range of economic activities and markets. Investigating other sources of legal uncertainty arising from different legal domains can shed light on their specific implications for economic outcomes.

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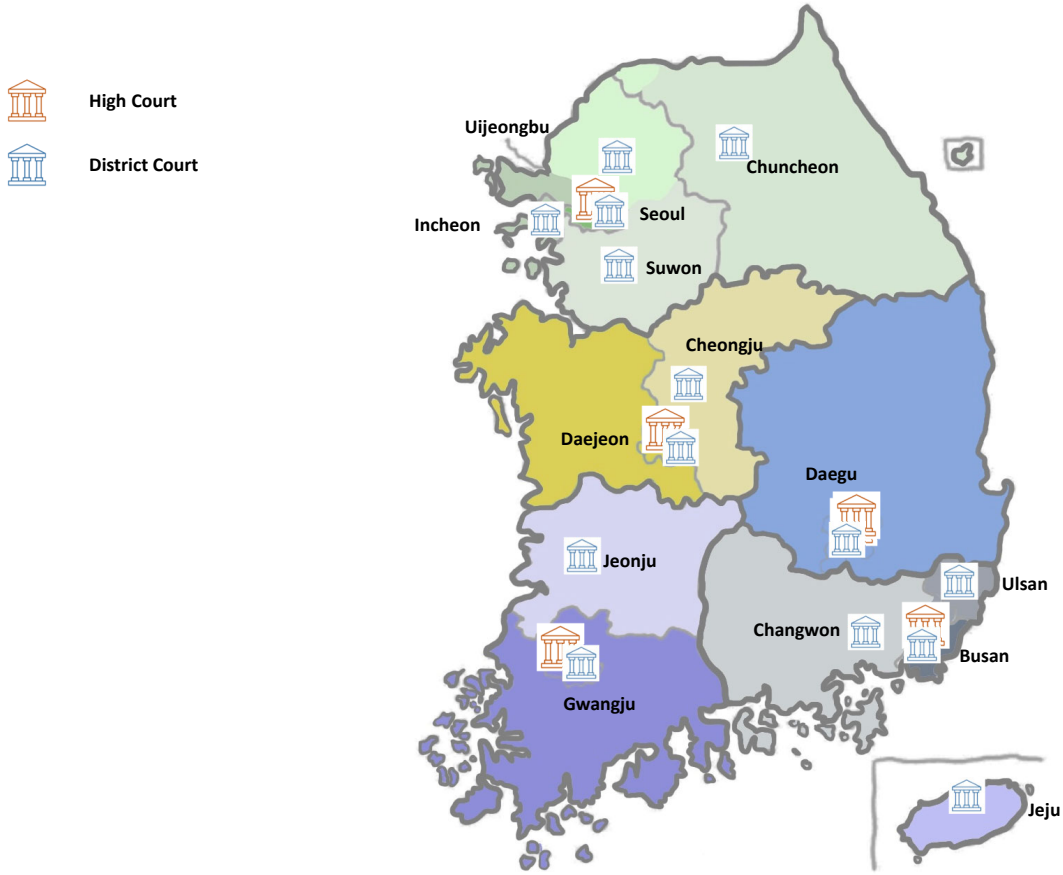
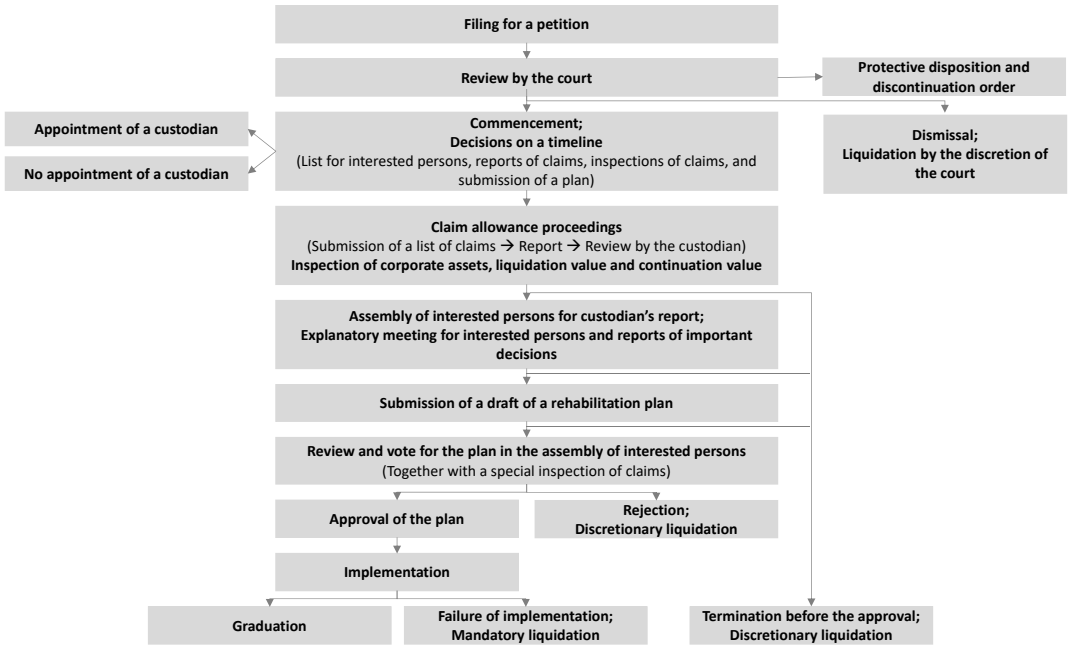
Figure 1: Court Zones



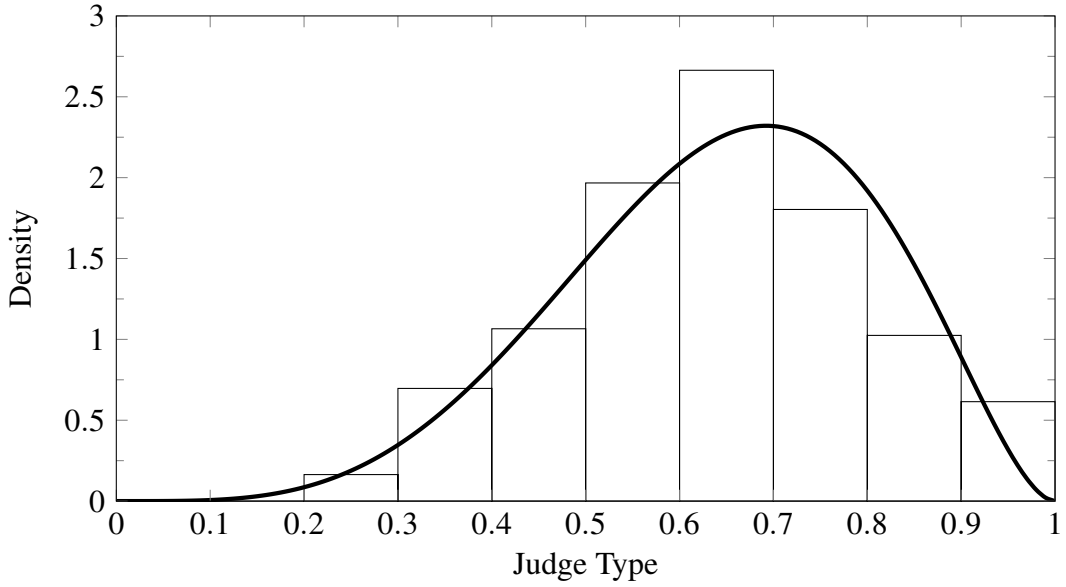
This figure depicts the location of District Courts and High Courts in Korea during our sample period. Each court zone is represented by a distinct color: green corresponds to Zone 1 (Seoul), yellow to Zone 2 (Daejeon), blue to Zone 3 (Daegu), gray to Zone 4 (Busan), and purple to Zone 5 (Gwangju).

Figure 2: In-court Restructuring Process



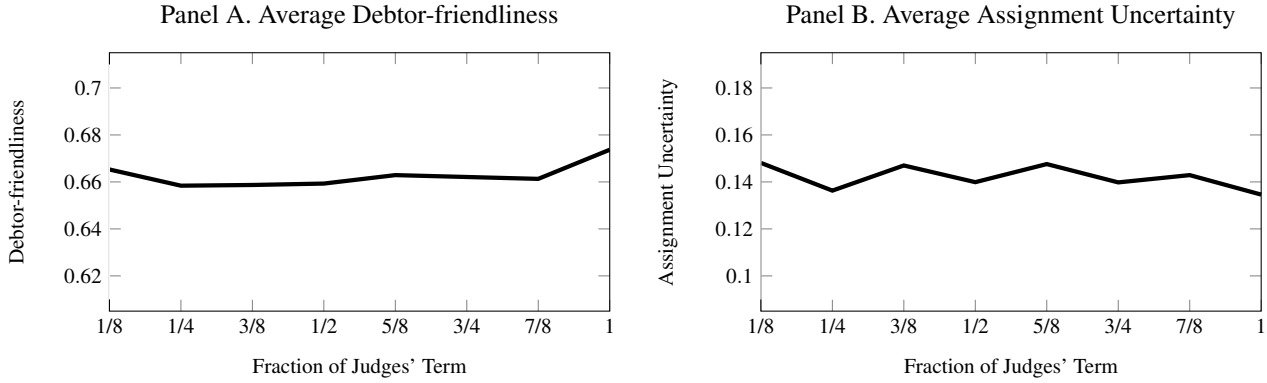
This figure illustrates the steps involved in the in-court restructuring process in Korea.

Figure 3: Judge Type Distribution



This figure shows a histogram displaying the empirical distribution of fully-informed judge types across all courts and terms in the data. Additionally, it overlays a beta distribution that corresponds to the calibrated parameters $\alpha_0 = 5.038$ and $\beta_0 = 2.796$. On the x-axis, the value 0 represents a judge that is completely creditor-friendly, while the value 1 represents a judge that is completely debtor-friendly.

Figure 4: Average Debtor-friendliness and Assignment Uncertainty over Judges' Terms



This figure shows the average debtor-friendliness (Panel A) and the average assignment uncertainty (Panel B) over judges' terms at a court as a function of the fraction of judges' term that has been completed.

Table 1: Court Zones

Administrative region	Local District Court	Court Zone District Court
	Zone 1: Seoul	
Gangwon-do	Chuncheon	Seoul
Incheon	Incheon	Seoul
West Gyeonggi-do	Incheon	Seoul
Seoul	Seoul	Seoul
South Gyeonggi-do	Suwon	Seoul
Cheorwon-gun	Uijeongbu	Seoul
North Gyeonggi-do	Uijeongbu	Seoul
	Zone 2: Daejeon	
Chungcheongbuk-do	Cheongju	Daejeon
Chungcheongnam-do	Daejeon	Daejeon
Daejeon	Daejeon	Daejeon
Sejong	Daejeon	Daejeon
	Zone 3: Daegu	
Daegu	Daegu	Daegu
Gyeongsangbuk-do	Daegu	Daegu
	Zone 4: Busan	
Busan	Busan	Busan
Gyeongsangnam-do	Changwon	Busan
Ulsan	Ulsan	Busan
Yangsan	Ulsan	Busan
	Zone 5: Gwangju	
Gwangju	Gwangju	Gwangju
Jeollanam-do	Gwangju	Gwangju
Jeju-do	Jeju	Gwangju
Jeollabuk-do	Jeonju	Gwangju

This table lists the District Courts that handle bankruptcy cases based on the location of firms' headquarters. Some firms have the option to choose between two courts, whereas other firms must file at a specific court. While Cheorwon-gun is part of Gangwon-do, it is assigned to a different court due to geographical considerations.

Table 2: Descriptive Statistics

Panel A: Legal data	
Number of cases	4,688
Case length	19.39 months
Number of decisions	23,900
Number of judges	327
Term length	23.57 months
Panel B: Loan data	
Number of firms	125,663
Individual loan volume	189 million KRW
Firm-level loan volume	1,326 million KRW
Interest rates (annual data)	0.0417
Panel C: Accounting data	
Number of firms	337,484
Employees	30
Total assets	9,567 million KRW
Total sales	9,678 million KRW
Investment	0.0219
Return on assets	0.0416
Leverage	0.4749

The table presents descriptive statistics. Panel A provides descriptive statistics for legal data, Panel B for loan data, and Panel C for accounting data.

Table 3: Judge Decisions

Decision	Coding
Accept case	Debtor-friendly
Prohibit seizure of assets	Debtor-friendly
Extension of plan submission period	Debtor-friendly
Approve debtor's plan	Debtor-friendly
Grant debtor request for modification of plan	Debtor-friendly
Successful graduation from procedure	Debtor-friendly
Dismissal of case	Creditor-friendly
Allow seizure of assets	Creditor-friendly
Reject extension of plan submission period	Creditor-friendly
Reject debtor's plan	Creditor-friendly
Reject debtor request for modification of plan	Creditor-friendly
Failed graduation from procedure	Creditor-friendly

This table lists the debtor-friendly and creditor-friendly decisions of judges in the data.

Table 4: Predicting Judge Types

Dep. var.: $\mu_{j,t>T/2}$	I	II	III
$\mu_{j,t\leq T/2}$	0.8505***	0.8384***	1.1116***
	[0.1548]	[0.1454]	[0.1916]
Court FE	no	yes	-
Court-Cycle FE	no	no	yes
Observations	327	327	327
R-squared	0.097	0.155	0.458

The table presents the results of estimating Equation (4). The dependent variable, $\mu_{j,t>T/2}$, represents the type of judge j based on their decisions in the second half of their term, while $\mu_{j,t\leq T/2}$ represents judge j's type based on their decisions in the first half of their term. The bottom section of the table provides information on fixed effects. *** denotes statistical significance at the 1% level.

Table 5: Restructuring Filings

Dep. var.: $F_{c,t}$	I	II	III
$\mu_{c,t-1}$	7.0558***	7.9931***	4.0066***
	[1.6511]	[2.2709]	[1.2282]
$\sigma_{c,t-1}$	-8.3979***	-9.5341***	-3.1517***
	[1.6076]	[2.1019]	[1.1368]
$N_{c,t-1}$	0.5700	1.0130	0.4431
	[0.4661]	[0.6541]	[0.3538]
$\tau_{c,t-1}$	1.4742***	1.5392***	0.2486
	[0.4346]	[0.5682]	[0.3073]
Court FE	yes	yes	yes
Month FE	yes	-	-
Court Zone-Month FE	no	yes	yes
Observations	1,183	1,183	1,183
R-squared	0.752	0.828	0.706

This table presents the results of estimating equation (7). In column III, the sample is limited to firms that can choose to file in either of two courts. The dependent variable, $F_{c,t}$, represents the number of restructuring filings in court c in month t. The variable $\mu_{c,t-1}$ denotes court c's debtor-friendliness at the end of month $t-1$. $\sigma_{c,t-1}$ denotes the level of assignment uncertainty at court c at the end of month $t-1$. $N_{c,t-1}$ captures type uncertainty, measured by the average number of decision made by judges at court c at the end of month $t-1$, in units of 100 decisions. $\tau_{c,t-1}$ denotes regime uncertainty, measured by the fraction of judges' term at court c completed at the end of month $t-1$. The bottom section provides information on fixed effects. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 6: Credit: Firm-bank Relationship Level

Dep. var.: $\log(L_{ib,t})$	I	II	III	IV
Sample	all	high risk	med risk	low risk
$\mu_{c,t-1}$	0.1611***	0.5927***	0.0206	0.0587
	[0.0298]	[0.0653]	[0.0474]	[0.0452]
$\sigma_{c,t-1}$	-0.0697***	-0.1563***	-0.0291**	-0.0216
	[0.0087]	[0.0194]	[0.0139]	[0.0132]
$N_{c,t-1}$	0.0127***	0.0322***	0.0128***	0.0048
	[0.0028]	[0.0061]	[0.0044]	[0.0041]
$\tau_{c,t-1}$	-0.0088***	-0.0344***	-0.0042	0.0016
	[0.0025]	[0.0055]	[0.0040]	[0.0037]
Firm FE	yes	yes	yes	yes
Bank FE	yes	yes	yes	yes
Court Zone-Month FE	yes	yes	yes	yes
Clustered SE	firm	firm	firm	firm
Observations	37,333,079	6,331,954	13,098,991	17,902,134
R-squared	0.540	0.578	0.563	0.518

This table presents the results of estimating Equation (8). Columns I displays the results for the full sample, column II for firms with an interest coverage ratio below 2, column III for firms with an interest coverage ratio between 2 and 5, and column IV for firms with an interest coverage ratio above 5. The dependent variable, $\log(L_{ib,t})$, represents the logarithm of total loan volume between bank b and firm i in month t. The variable $\mu_{c,t-1}$ denotes court c's debtor-friendliness at the end of month $t-1$. $\sigma_{c,t-1}$ denotes the level of assignment uncertainty at court c at the end of month $t-1$. $N_{c,t-1}$ captures type uncertainty, measured by the average number of decision made by judges at court c at the end of month $t-1$, in units of 100 decisions. $\tau_{c,t-1}$ denotes regime uncertainty, measured by the fraction of judges' term at court c completed at the end of month $t-1$. The bottom section provides information on fixed effects and the clustering of standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 7: Credit: Firm Level

Dep. var.: $\log(L_{i,t})$	I	II	III	IV
Sample	all	high risk	med risk	low risk
$\mu_{c,t-1}$	0.2014***	0.9135***	0.0245	0.1017
	[0.0435]	[0.0793]	[0.0664]	[0.0681]
$\sigma_{c,t-1}$	-0.0632***	-0.2065***	0.0069	-0.0245
	[0.0128]	[0.0226]	[0.0191]	[0.0203]
$N_{c,t-1}$	0.0079*	0.0432***	-0.0010	0.0049
	[0.0042]	[0.0077]	[0.0064]	[0.0066]
$\tau_{c,t-1}$	-0.0263***	-0.0611***	-0.0125**	-0.0208***
	[0.0041]	[0.0080]	[0.0062]	[0.0064]
Firm FE	yes	yes	yes	yes
Court Zone-Month FE	yes	yes	yes	yes
Clustered SE	firm	firm	firm	firm
Observations	4,784,434	662,338	1,600,905	2,518,222
R-squared	0.827	0.879	0.841	0.791

This table presents the results of estimating equation (9). Column I shows results for the full sample, column II for firms with an interest coverage ratio below 2, column III for firms with an interest coverage ratio between 2 and 5, and column IV for firms with an interest coverage ratio above 5. The dependent variable, $\log(L_{i,t})$, represents the logarithm of total loan volume of firm i in month t. The variable $\mu_{c,t-1}$ denotes court c's debtor-friendliness at the end of month $t-1$. $\sigma_{c,t-1}$ denotes the level of assignment uncertainty at court c at the end of month $t-1$. $N_{c,t-1}$ captures type uncertainty, measured by the average number of decision made by judges at court c at the end of month $t-1$, in units of 100 decisions. $\tau_{c,t-1}$ denotes regime uncertainty, measured by the fraction of judges' term at court c completed at the end of month $t-1$. The bottom section provides information on fixed effects and the clustering of standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 8: Credit: Demand and Supply

Dep. var.: $R_{i,t}$	I	II	III	IV
Sample	all	high risk	med risk	low risk
$\overline{\mu}_{c,t}$	0.0114***	0.0212***	0.0038	-0.0016
	[0.0040]	[0.0057]	[0.0085]	[0.0074]
$\overline{\sigma}_{c,t}$	-0.0016	-0.0028*	0.00002	-0.0006
	[0.0011]	[0.0016]	[0.0022]	[0.0021]
$\overline{N}_{c,t}$	-0.0016	-0.0028*	0.0027	-0.0014
	[0.0011]	[0.0015]	[0.0024]	[0.0021]
$\overline{\tau}_{c,t}$	0.0022**	0.0026**	0.0010	0.0024
	[0.0009]	[0.0012]	[0.0020]	[0.0018]
Firm FE	yes	yes	yes	yes
Court Zone-Month FE	yes	yes	yes	yes
Clustered SE	firm	firm	firm	firm
Observations	41,076	22,143	7,223	11,710
R-squared	0.694	0.707	0.664	0.660

This table presents the results of estimating equation (10). Column I shows results for the full sample, column II for firms with an interest coverage ratio below 2, column III for firms with an interest coverage ratio between 2 and 5, and column IV for firms with an interest coverage ratio above 5. The dependent variable, $R_{i,t}$, represents the average interest rate of all loans of firm i in year t. The variables $\overline{\mu}_{c,t}$, $\overline{\sigma}_{c,t}$, $\overline{N}_{c,t}$, and $\overline{\tau}_{c,t}$, are the annual averages of the monthly measures of debtor-friendliness, assignment uncertainty, type uncertainty, and regime uncertainty, respectively. The bottom section provides information on fixed effects and the clustering of standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 9: Real Effects

Dep. var.: $I_{i,t}$	I	II	III	IV
Sample	all	high risk	med risk	low risk
$\overline{\mu}_{c,t}$	-0.0030	0.0613***	-0.0225	-0.0092
	[0.0071]	[0.0162]	[0.0161]	[0.0089]
$\overline{\sigma}_{c,t}$	-0.0075***	-0.0218***	-0.0033	0.0029
	[0.0020]	[0.0046]	[0.0045]	[0.0025]
$\overline{N}_{c,t}$	0.0049**	0.0243***	0.0048	0.0037
	[0.0022]	[0.0050]	[0.0051]	[0.0028]
$\overline{\tau}_{c,t}$	-0.0004	-0.0071*	-0.0031	0.0028
	[0.0020]	[0.0043]	[0.0048]	[0.0025]
Firm FE	yes	yes	yes	yes
Court Zone-Month FE	yes	yes	yes	yes
Clustered SE	firm	firm	firm	firm
Observations	720,239	158,209	144,487	417,543
R-squared	0.279	0.250	0.295	0.295

This table presents the results of estimating equation (10) with $I_{i,t}$ as the dependent variable. Column I shows results for the full sample, column II for firms with an interest coverage ratio below 2, column III for firms with an interest coverage ratio between 2 and 5, and column IV for firms with an interest coverage ratio above 5. The variable $I_{i,t}$ is the change in fixed assets over total assets for firm i in year t. The variables $\overline{\mu}_{c,t}$, $\overline{\sigma}_{c,t}$, $\overline{N}_{c,t}$, and $\overline{\tau}_{c,t}$, are the annual averages of the monthly measures of debtor-friendliness, assignment uncertainty, type uncertainty, and regime uncertainty, respectively. The bottom section provides information on fixed effects and the clustering of standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 10: Different Priors

Dep. var.: $\log(L_{ib,t})$	I	II	III	IV
Sample	all	high risk	med risk	low risk
Panel A: $\alpha_0+\beta_0=5$				
$\mu_{c,t-1}$	0.1343***	0.5261***	0.0115	0.0416
	[0.0264]	[0.0578]	[0.0421]	[0.0400]
$\sigma_{c,t-1}$	-0.0612***	-0.1298***	-0.0266**	-0.0233**
	[0.0073]	[0.0161]	[0.0115]	[0.0110]
$N_{c,t-1}$	0.0109***	0.0297***	0.0123***	0.0025
	[0.0026]	[0.0056]	[0.0040]	[0.0039]
$\tau_{c,t-1}$	-0.0088***	-0.0302***	-0.0043	0.0007
	[0.0025]	[0.0056]	[0.0040]	[0.0037]
Observations	37,333,079	6,331,954	13,098,991	17,902,134
R-squared	0.540	0.578	0.563	0.518
Panel B: $\alpha_0+\beta_0=10$				
$\mu_{c,t-1}$	0.1664***	0.5917***	0.0415	0.0558
	[0.0291]	[0.0632]	[0.0522]	[0.0441]
$\sigma_{c,t-1}$	-0.0621***	-0.1427***	-0.0263**	-0.0172
	[0.0082]	[0.0183]	[0.0132]	[0.0125]
$N_{c,t-1}$	0.0046***	0.0137***	0.0053***	0.0008
	[0.0012]	[0.0027]	[0.0019]	[0.0018]
$\tau_{c,t-1}$	-0.0079***	-0.0315***	-0.0033	0.0017
	[0.0025]	[0.0057]	[0.0041]	[0.0038]
Firm FE	yes	yes	yes	yes
Bank FE	yes	yes	yes	yes
Court Zone-Month FE	yes	yes	yes	yes
Clustered SE	firm	firm	firm	firm
Observations	37,333,079	6,331,954	13,098,991	17,902,134
R-squared	0.540	0.578	0.563	0.518

The table presents the results of estimating Equation (8). Panel A sets the strength of the prior to $\alpha_0+\beta_0=5$, while Panel B sets it to $\alpha_0+\beta_0=10$. Column I shows results for the full sample, column II for firms with an interest coverage ratio below 2, column III for firms with an interest coverage ratio between 2 and 5, and column IV for firms with an interest coverage ratio above 5. The dependent variable, $\log(L_{ib,t})$, represents the logarithm of total loan volume between bank b and firm i in month t. The variable $\mu_{c,t-1}$ denotes court c's debtor-friendliness at the end of month $t-1$. $\sigma_{c,t-1}$ denotes the level of assignment uncertainty at court c at the end of month $t-1$. $N_{c,t-1}$ captures type uncertainty, measured by the average number of decision made by judges at court c at the end of month $t-1$, in units of 100 decisions. $\tau_{c,t-1}$ denotes regime uncertainty, measured by the fraction of judges' term at court c completed at the end of month $t-1$. The bottom section provides information on fixed effects and the clustering of standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 11: Informed Priors

Dep. var.: $\log(L_{ib,t})$	I	II	III	IV
Sample	all	high risk	med risk	low risk
$\mu_{c,t-1}$	0.1681***	0.3988***	0.0602	0.1366***
	[0.0286]	[0.0626]	[0.0455]	[0.0438]
$\sigma_{c,t-1}$	-0.0733***	-0.2357***	-0.0388***	-0.0026
	[0.0150]	[0.0340]	[0.0242]	[0.0225]
$\hat{\mu}_{c,t}$	-0.0062	0.2165***	-0.0388	-0.0838***
	[0.0170]	[0.0378]	[0.0278]	[0.0256]
$\hat{\sigma}_{c,t}$	0.0030	0.0395***	0.0151	-0.0082
	[0.0076]	[0.0169]	[0.0121]	[0.0116]
$N_{c,t-1}$	0.0168***	0.0381***	0.0172***	0.0088**
	[0.0029]	[0.0064]	[0.0045]	[0.0044]
$\tau_{c,t-1}$	-0.0099***	-0.0310***	-0.0053	-0.0012
	[0.0025]	[0.0057]	[0.0041]	[0.0038]
Firm FE	yes	yes	yes	yes
Bank FE	yes	yes	yes	yes
Court Zone-Month FE	yes	yes	yes	yes
Clustered SE	firm	firm	firm	firm
Observations	37,333,079	6,331,954	13,098,991	17,902,134
R-squared	0.540	0.578	0.563	0.518

This table presents the results of estimating equation (8). Column I shows results for the full sample, column II for firms with an interest coverage ratio below 2, column III for firms with an interest coverage ratio between 2 and 5, and column IV for firms with an interest coverage ratio above 5. The dependent variable, $\log(L_{ib,t})$, represents the logarithm of total loan volume between bank b and firm i in month t. The variable $\mu_{c,t-1}$ denotes court c's debtor-friendliness at the end of month $t-1$. $\sigma_{c,t-1}$ denotes the level of assignment uncertainty at court c at the end of month $t-1$. $N_{c,t-1}$ captures type uncertainty, measured by the average number of decision made by judges at court c at the end of month $t-1$, in units of 100 decisions. $\tau_{c,t-1}$ denotes regime uncertainty, measured by the fraction of judges' term at court c completed at the end of month $t-1$. The variables $\hat{\mu}_{c,t}$ and $\hat{\sigma}_{c,t}$ represent courts' debtor-friendliness and assignment uncertainty, respectively, based on all observed judge decisions during the judges' term. The bottom section provides information on fixed effects and the clustering of standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 12: Firms without Choice of Court

Dep. var.: $\log(L_{ib,t})$	I	II	III	IV	V
Sample	all		high risk	med risk	low risk
$\mu_{c,t-1}$	0.1790***	0.2493***	0.7204***	-0.0486	0.1312**
	[0.0200]	[0.0298]	[0.0635]	[0.0481]	[0.0450]
$\sigma_{c,t-1}$	-0.0161*	-0.0148	-0.1288***	-0.1373***	0.0360
	[0.0082]	[0.0165]	[0.0360]	[0.0264]	[0.0248]
$N_{c,t-1}$	0.0048***	0.0022	0.0218***	-0.0052	-0.0014
	[0.0016]	[0.0026]	[0.0061]	[0.0042]	[0.0038]
$\tau_{c,t-1}$	-0.0118***	-0.0141***	-0.0672***	0.0014	-0.0008
	[0.0019]	[0.0030]	[0.0067]	[0.0049]	[0.0046]
Firm FE	yes	yes	yes	yes	yes
Bank FE	yes	yes	yes	yes	yes
Month FE	yes	yes	yes	yes	yes
Clustered SE	firm	firm	firm	firm	firm
Observations	37,333,079	19,607,867	3,130,963	6,686,989	9,789,915
R-squared	0.540	0.549	0.580	0.575	0.529

This table shows the results of estimating equation (8) for the full sample in column I and for firms that cannot choose between two courts in columns II to V. Column III shows results for firms with an interest coverage ratio below 2, column IV for firms with an interest coverage ratio between 2 and 5, and column V for firms with an interest coverage ratio above 5. The dependent variable, $\log(L_{ib,t})$, represents the logarithm of total loan volume between bank b and firm i in month t. The variable $\mu_{c,t-1}$ denotes court c's debtor-friendliness at the end of month $t-1$. $\sigma_{c,t-1}$ denotes the level of assignment uncertainty at court c at the end of month $t-1$. $N_{c,t-1}$ captures type uncertainty, measured by the average number of decision made by judges at court c at the end of month $t-1$, in units of 100 decisions. $\tau_{c,t-1}$ denotes regime uncertainty, measured by the fraction of judges' term at court c completed at the end of month $t-1$. The bottom section provides information on fixed effects and the clustering of standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 13: Industry Shocks

Dep. var.: $\log(L_{ib,t})$	I	II	III	IV
Sample	all	high risk	med risk	low risk
$\mu_{c,t-1}$	0.1332***	0.6500***	0.0545	0.0287
	[0.0303]	[0.0671]	[0.0481]	[0.0459]
$\sigma_{c,t-1}$	-0.0495***	-0.1654***	-0.0344**	-0.0042
	[0.0089]	[0.0200]	[0.0141]	[0.0135]
$N_{c,t-1}$	0.0089***	0.0311***	0.0104**	0.0006
	[0.0028]	[0.0063]	[0.0046]	[0.0043]
$\tau_{c,t-1}$	-0.0072***	-0.0364***	-0.0043	0.0039
	[0.0025]	[0.0057]	[0.0041]	[0.0038]
Firm FE	yes	yes	yes	yes
Bank FE	yes	yes	yes	yes
Industry-Month FE	yes	yes	yes	yes
Court Zone-Month FE	yes	yes	yes	yes
Clustered SE	firm	firm	firm	firm
Observations	37,333,079	6,331,954	13,098,991	17,902,134
R-squared	0.541	0.579	0.564	0.519

This table presents the results of estimating equation (8). Column I shows results for the full sample, column II for firms with an interest coverage ratio below 2, column III for firms with an interest coverage ratio between 2 and 5, and column IV for firms with an interest coverage ratio above 5. The dependent variable, $\log(L_{ib,t})$, represents the logarithm of total loan volume between bank b and firm i in month t. The variable $\mu_{c,t-1}$ denotes court c's debtor-friendliness at the end of month $t-1$. $\sigma_{c,t-1}$ denotes the level of assignment uncertainty at court c at the end of month $t-1$. $N_{c,t-1}$ captures type uncertainty, measured by the average number of decision made by judges at court c at the end of month $t-1$, in units of 100 decisions. $\tau_{c,t-1}$ denotes regime uncertainty, measured by the fraction of judges' term at court c completed at the end of month $t-1$. The bottom section provides information on fixed effects and the clustering of standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 14: Bank Quality

Dep. var.: $\log(L_{ib,t})$	I	II	III	IV
Sample	all	high risk	med risk	low risk
$\mu_{c,t-1}$	0.1277***	0.5891***	-0.0178	0.0285
	[0.0303]	[0.0669]	[0.0485]	[0.0461]
$\sigma_{c,t-1}$	-0.0467***	-0.1467***	-0.0056	0.0018
	[0.0089]	[0.0200]	[0.0143]	[0.0135]
$N_{c,t-1}$	0.0069**	0.0267***	0.0076*	-0.0014
	[0.0028]	[0.0062]	[0.0045]	[0.0042]
$\tau_{c,t-1}$	-0.0105***	-0.0379***	-0.0051	-0.0012
	[0.0025]	[0.0058]	[0.0042]	[0.0038]
Firm FE	yes	yes	yes	yes
Bank-Month FE	yes	yes	yes	yes
Court Zone-Month FE	yes	yes	yes	yes
Clustered SE	firm	firm	firm	firm
Observations	37,333,079	6,331,954	13,098,991	17,902,134
R-squared	0.546	0.583	0.568	0.528

This table presents the results of estimating equation (8). Column I shows results for the full sample, column II for firms with an interest coverage ratio below 2, column III for firms with an interest coverage ratio between 2 and 5, and column IV for firms with an interest coverage ratio above 5. The dependent variable, $\log(L_{ib,t})$, represents the logarithm of total loan volume between bank b and firm i in month t. The variable $\mu_{c,t-1}$ denotes court c's debtor-friendliness at the end of month $t-1$. $\sigma_{c,t-1}$ denotes the level of assignment uncertainty at court c at the end of month $t-1$. $N_{c,t-1}$ captures type uncertainty, measured by the average number of decision made by judges at court c at the end of month $t-1$, in units of 100 decisions. $\tau_{c,t-1}$ denotes regime uncertainty, measured by the fraction of judges' term at court c completed at the end of month $t-1$. The bottom section provides information on fixed effects and the clustering of standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 15: Excluding Large Firms

Dep. var.: $\log(L_{ib,t})$	I	II	III	IV
Sample	all	high risk	med risk	low risk
$\mu_{c,t-1}$	0.1342***	0.5528***	0.0305	0.0035
	[0.0306]	[0.0674]	[0.0487]	[0.0464]
$\sigma_{c,t-1}$	-0.0749***	-0.1686***	-0.0343**	-0.0185
	[0.0089]	[0.0199]	[0.0141]	[0.0134]
$N_{c,t-1}$	0.0106***	0.0327***	0.0096**	0.0022
	[0.0028]	[0.0063]	[0.0045]	[0.0042]
$\tau_{c,t-1}$	-0.0084***	-0.0290***	-0.0063	0.0018
	[0.0025]	[0.0058]	[0.0041]	[0.0038]
Firm FE	yes	yes	yes	yes
Bank FE	yes	yes	yes	yes
Court Zone-Month FE	yes	yes	yes	yes
Clustered SE	firm	firm	firm	firm
Observations	33,487,810	5,494,205	11,856,798	16,136,807
R-squared	0.491	0.529	0.516	0.468

This table presents the results of estimating equation (8) for firms with assets below 10bn KRW. Column II shows results for firms with an interest coverage ratio below 2, column III for firms with an interest coverage ratio between 2 and 5, and column IV for firms with an interest coverage ratio above 5. The dependent variable, $\log(L_{ib,t})$, represents the logarithm of total loan volume between bank b and firm i in month t. The variable $\mu_{c,t-1}$ denotes court c's debtor-friendliness at the end of month $t-1$. $\sigma_{c,t-1}$ denotes the level of assignment uncertainty at court c at the end of month $t-1$. $N_{c,t-1}$ captures type uncertainty, measured by the average number of decision made by judges at court c at the end of month $t-1$, in units of 100 decisions. $\tau_{c,t-1}$ denotes regime uncertainty, measured by the fraction of judges' term at court c completed at the end of month $t-1$. The bottom section provides information on fixed effects and the clustering of standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

A Proofs and Extensions

A.1 Proofs

Proof of Lemma 1. We have

$$\mathbb{E}\left[P-C+\sum_{i=1}^{N}\frac{1-\Lambda_i}{N}D\right]=P-C+\sum_{i=1}^{N}\frac{1-\mathbb{E}[\Lambda]}{N}D=P-C+\left(1-\mathbb{E}\left[\mathbb{E}[\Lambda|\theta]\right]\right)D,$$

and

$$\begin{aligned}
\mathrm{Var}\left[P-C+\sum_{i=1}^{N}\frac{1-\Lambda_i}{N}D\right] &= \frac{D^2}{N^2}\left(\mathbb{E}\left[\mathrm{Var}\left[\sum_{i=1}^{N}\Lambda_i\middle|\theta\right]\right]+\mathrm{Var}\left[\mathbb{E}\left[\sum_{i=1}^{N}\Lambda_i\middle|\theta\right]\right]\right)\\
&= \frac{D^2}{N^2}\left(\mathbb{E}\left[\sum_{i=1}^{N}\mathrm{Var}\left[\Lambda_i|\theta\right]\right]+\mathrm{Var}\left[\sum_{i=1}^{N}\mathbb{E}\left[\Lambda_i|\theta\right]\right]\right)\\
&= \frac{D^2}{N^2}\left(\mathbb{E}\left[N\,\mathrm{Var}\left[\Lambda|\theta\right]\right]+\mathrm{Var}\left[N\mathbb{E}\left[\Lambda|\theta\right]\right]\right)\\
&= \frac{D^2}{N}\mathbb{E}\left[\mathrm{Var}\left[\Lambda|\theta\right]\right]+D^2\,\mathrm{Var}\left[\mathbb{E}\left[\Lambda|\theta\right]\right],
\end{aligned}$$

which proves the statement. ■

Proof of Proposition 2. The demand constraint of a producer remains the same as in the baseline model, given by Equation (1). The supply constraint, on the other hand, can be derived from Lemma 1 and is expressed as follows:

$$P\geq C-\left(1-\mathbb{E}\left[\mathbb{E}[\Lambda|\theta]\right]\right)D+\frac{\gamma}{2}D^2\left(\frac{1}{N}\mathbb{E}\left[\mathrm{Var}\left[\Lambda|\theta\right]\right]+\mathrm{Var}\left[\mathbb{E}\left[\Lambda|\theta\right]\right]\right).$$

The result is obtained by considering both the demand and supply constraints, as discussed in Section 2.2. ■

Proof of Proposition 3. Denote the producer's payoff by V and the supplier's payoff by W. The

conditional expectation and the conditional variance of the producer's payoff are given by:

$$\mathbb{E}[V|\eta] = R - \left(1 - \left(\eta\mathbb{E}[\Lambda_f] + (1-\eta)\mathbb{E}[\Lambda_c]\right)\right) D - P,$$

and

$$\mathrm{Var}[V|\eta] = \left(\eta\,\mathrm{Var}[\Lambda_f] + (1-\eta)\,\mathrm{Var}[\Lambda_c]\right) D^2,$$

respectively. Hence, the unconditional expectation and variance of the producer's payoff are:

$$\mathbb{E}[V] = \mathbb{E}\left[\mathbb{E}[V|\eta]\right] = R - \left(1 - \left(q\mathbb{E}[\Lambda_f] + (1-q)\mathbb{E}[\Lambda_c]\right)\right) D - P,$$

and

$$\mathrm{Var}[V] = \mathbb{E}[\mathrm{Var}[V|\eta]] + \mathrm{Var}[\mathbb{E}[V|\eta]] = \left(q\,\mathrm{Var}[\Lambda_f] + (1-q)\,\mathrm{Var}[\Lambda_c]\right) D^2 + q(1-q)D^2\left(\mathbb{E}[\Lambda_c] - \mathbb{E}[\Lambda_f]\right)^2.$$

The conditional expectation and the conditional variance of the supplier's payoff are given by:

$$\mathbb{E}[W|\eta] = P - C + \left(1 - \left(\eta\mathbb{E}[\Lambda_f] + (1-\eta)\mathbb{E}[\Lambda_c]\right)\right) D,$$

and

$$\mathrm{Var}[W|\eta] = \left(\eta\,\mathrm{Var}[\Lambda_f] + (1-\eta)\,\mathrm{Var}[\Lambda_c]\right) D^2,$$

respectively. Thus, the unconditional expectation and variance of the supplier's payoff are:

$$\mathbb{E}[W] = \mathbb{E}\left[\mathbb{E}[W|\eta]\right] = P - C + \left(1 - \left(q\mathbb{E}[\Lambda_f] + (1-q)\mathbb{E}[\Lambda_c]\right)\right) D,$$

and

$$\mathrm{Var}[W] = \mathbb{E}\left[\mathrm{Var}[W|\eta]\right] + \mathrm{Var}\left[\mathbb{E}[W|\eta]\right] = \left(q\,\mathrm{Var}[\Lambda_f] + (1-q)\,\mathrm{Var}[\Lambda_c]\right) D^2 + q(1-q)D^2\left(\mathbb{E}[\Lambda_c] - \mathbb{E}[\Lambda_f]\right)^2.$$

As a result, for production to be feasible, we require:

$$R - C \geq \gamma D^2 \left(q \operatorname{Var}[\Lambda_f] + (1-q) \operatorname{Var}[\Lambda_c] + q(1-q) \left(\mathbb{E}[\Lambda_c] - \mathbb{E}[\Lambda_f] \right)^2 \right),$$

which completes the proof. ■

Proof of Lemmas 2 and 3. We have the expression:

$$\mathbb{E}\left[\Lambda|\theta\right] = \frac{1}{J} \sum_{j \in J} \mathbb{E}\left[\lambda_j | \theta_j\right],$$

which implies:

$$\operatorname{Var}\left[\mathbb{E}\left[\Lambda|\theta\right]\right] = \frac{1}{J^2} \operatorname{Var}\left[\sum_{j \in J} \mathbb{E}\left[\lambda_j | \theta_j\right]\right] = \frac{1}{J^2} \sum_{j \in J} \operatorname{Var}\left[\mathbb{E}\left[\lambda_j | \theta_j\right]\right].$$

Further derivations lead to:

$$\operatorname{Var}\left[\Lambda|\theta\right] = \frac{1}{J} \sum_{j \in J} \operatorname{Var}\left[\lambda_j | \theta_j\right] + \frac{1}{J} \sum_{j \in J} \left(\mathbb{E}\left[\lambda_j | \theta_j\right] - \frac{1}{J} \sum_{k \in J} \mathbb{E}\left[\lambda_k | \theta_k\right] \right)^2,$$

and

$$\mathbb{E}\left[\operatorname{Var}\left[\Lambda|\theta\right]\right] = \frac{1}{J} \sum_{j \in J} \left(\mathbb{E}\left[\lambda_j\right] - \frac{1}{J} \sum_{k \in J} \mathbb{E}\left[\lambda_k\right] \right)^2 + \frac{1}{J} \sum_{j \in J} \operatorname{Var}\left[\lambda_j\right] - \frac{1}{J^2} \sum_{j \in J} \operatorname{Var}\left[\mathbb{E}\left[\lambda_j | \theta_j\right]\right],$$

which completes the proof.

A.2 Model Extension with $\pi \in [0,1]$

We introduce the random variable $\nu \in \{0,1\}$ to represent the occurrence of a legal dispute, where $\nu = 1$ indicates the presence of a dispute. In particular, $\mathbb{P}(\nu = 1) = \pi$. We assume that ν and Λ

are independent. The producer's payoff is given by $V = R - (1-\Lambda)\nu D - P$. Let us consider its conditional expectation and conditional variance. The conditional expectation of V given ν is:

$$\mathbb{E}[V|\nu] = R - (1 - \mathbb{E}[\mathbb{E}[\Lambda|\theta]])\nu D - P.$$

The conditional variance of V given ν is:

$$\mathrm{Var}[V|\nu] = \nu^2 D^2 \mathrm{Var}[\Lambda] = \nu D^2 \left(\mathbb{E}[\mathrm{Var}[\Lambda|\theta]] + \mathrm{Var}[\mathbb{E}[\Lambda|\theta]]\right),$$

From these expressions, we can derive the unconditional expectation and variance of V. The unconditional expectation is:

$$\mathbb{E}[V] = \mathbb{E}[\mathbb{E}[V|\nu]] = R - (1 - \mathbb{E}[\mathbb{E}[\Lambda|\theta]])\pi D - P.$$

The unconditional variance is:

$$\mathrm{Var}[V] = \mathbb{E}[\mathrm{Var}[V|\nu]] + \mathrm{Var}[\mathbb{E}[V|\nu]] = \\ \pi D^2 \left(\mathbb{E}[\mathrm{Var}[\Lambda|\theta]] + \mathrm{Var}[\mathbb{E}[\Lambda|\theta]]\right) + \pi(1-\pi)D^2(1 - \mathbb{E}[\mathbb{E}[\Lambda|\theta]])^2.$$

The supplier's payoff is given by $W = P - C + (1-\Lambda)\nu D$. Let us examine its conditional expectation and conditional variance. The conditional expectation of W given ν is:

$$\mathbb{E}[W|\nu] = P - C + (1 - \mathbb{E}[\mathbb{E}[\Lambda|\theta]])\nu D.$$

The conditional variance of W given ν is:

$$\mathrm{Var}[W|\nu] = \nu^2 D^2 \mathrm{Var}[\Lambda] = \nu D^2 \left(\mathbb{E}[\mathrm{Var}[\Lambda|\theta]] + \mathrm{Var}[\mathbb{E}[\Lambda|\theta]]\right).$$

From these expressions, we can obtain the unconditional expectation and variance of W. The unconditional expectation is:

$$\mathbb{E}[W] = \mathbb{E}[\mathbb{E}[W|\nu]] = P - C + (1 - \mathbb{E}[\mathbb{E}[\Lambda|\theta]])\pi D,$$

The unconditional variance is:

$$\mathrm{Var}[W] = \mathbb{E}\left[\mathrm{Var}[W|\nu]\right] + \mathrm{Var}\left[\mathbb{E}[W|\nu]\right] = \\ \pi D^2 \left(\mathbb{E}[\mathrm{Var}\left[\Lambda|\theta\right]] + \mathrm{Var}[\mathbb{E}\left[\Lambda|\theta\right]]\right) + \pi(1-\pi)D^2(1-\mathbb{E}[\mathbb{E}\left[\Lambda|\theta\right]])^2.$$

We can apply the same methodology as in Section 2.2 to derive the demand and supply constraints. By considering these two constraints together, we can determine if there exists an input price that allows for production. The condition for production is given by:

$$R - C \geq \gamma D^2 \left(\pi \left(\mathbb{E}[\mathrm{Var}\left[\Lambda|\theta\right]] + \mathrm{Var}[\mathbb{E}\left[\Lambda|\theta\right]]\right) + \pi(1-\pi)(1-\mathbb{E}[\mathbb{E}\left[\Lambda|\theta\right]])^2\right),$$

which completes the proof. ■