Three Essays on Corporate Debt Financing

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ABSTRACT

Three essays on corporate debt financing

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In the first of three essays, we study the relationship between corporate debt structures and the strength of creditor rights. Firms use a more concentrated debt-type structure as a reaction mechanism to stronger creditor rights. We show that managers form more concentrated debt structures in response to stronger creditor rights in order to first, reduce bankruptcy costs and second, to provide more monitoring incentives for creditors. Across 46 countries, we document that firms have more concentrated debt-type structures in countries with stronger creditor rights. Based on an examination of the cross-sectional heterogeneity of firms to different creditor rights regimes, we confirm our two proposed mechanisms. This study extends the literature of debt structure to an international setting and is the first to document the effect of cross-country legal and institutional determinants on the choice of debt structures.

In the second essay, we investigate how uncertainty about economic policies influence corporate credit spreads. We find a large and positive association between corporate credit spreads and a news-based index of policy uncertainty. We document that a one standard deviation increase in policy uncertainty results in 25 basis points increase in the credit spreads of corporate bonds controlling for bond, firm and macro-economic variables. We find that the influence of policy uncertainty on corporate credit spreads differs across firms and is more pronounced for firms with higher investment irreversibility and dependence on government spending. We also document a larger impact of policy uncertainty during economic recessions. Our results show that not only firm-level default probabilities, but also bond-CDS bases increase in response to elevated policy uncertainty.

The third and final essay empirically measures the financial and economic costs (benefits) to firm value associated with deteriorations or improvements in the firm's credit quality. We document that firms incur economically large and statistically significant costs to their values following credit-rating deteriorations. Consistent with an asymmetric effect, we find significant but smaller firm-value benefits associated with credit-rating upgrades. The financial costs to a firm's market value associated with each notch downgrade to the investment and speculative grade categories are 7.1% and 14.8%, respectively, and these costs are generally larger than the economic costs to the firm value from credit rating downgrades. Using a continuous KMV distance to default model, we conclude that deteriorations (improvements) in a model-generated credit rating quality can also adversely (positively) affect firm value. Our findings have implications for corporate financing and leverage decisions, and for the unresolved underleverage puzzle (Graham, 2001).

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Chapter 1:

Introduction

Debt financing has been the main vehicle for raising capital for projects throughout the history of corporate finance. In the US, the size of the corporate debt market reached 39.5 trillion dollars in 2015, outsizing the US equity market by 1.5 times[1]. Nowadays, debt contracts play a significant role in connecting financial markets around the world. The internationalized debt markets have proven to be able to facilitate access to cheap debt capital for firms in different countries and at the same time, aid the transmission of economic and credit shocks throughout the global markets. Related examples abound and include the East Asia crisis of 1997 as well as the debt-related hardships across European economies following the credit crunch of 2008.

When firms raise debt from the market, they do it in a variety of forms and contractual formats, with varying amounts and different maturities. Creditors, on the other hand, face a variety of risks when lending to corporations including firm-specific, market-related as well as political and institutional risks. In this thesis we shed light on different aspects of debt financing by studying the behaviour of corporate debt structures, the pricing of policy uncertainty in debt contracts and the costs of debt associated with deteriorations in credit ratings. Therefore, this thesis answers three questions about debt financing: (1) How do creditor rights affect debt-type concentration? (2) How does policy uncertainty impact the cost of debt financing? (3) How large are the costs and benefits of credit rating changes?

In chapter 2 (first essay), we provide answers for the first question by examining how the strength of creditor rights influences the extent to which a firm's debt-type structure is concentrated or heterogeneous. To pursue this, we investigate the effects of legal determinants and particularly the strength of creditor rights on the formation of different corporate debt structures. Legal and contractual aspects of debt are central to how firms and creditors enter into financing contracts. Countries worldwide have developed institutions and mechanisms to enforce debt contracts without the necessity of exerting violence. How these institutions are designed and perform influences creditors' and borrowers' expectations of the outcomes of debt contracts, particularly in the event of bankruptcy. With significant variations in the strength of creditor rights across different countries, the influence of such rights on firms' use of debt instruments and their combinations becomes largely important.

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[1] According to this recent Wall Street Journal commentary http://www.wsj.com/articles/the-new-bond-market-bigger-riskier-and-more-fragile-than-ever-1442808001

Theoretically, we predict that firms change their debt concentration when creditor rights are strong. Our main hypothesis is that firms react to stronger creditor rights by increasing their debt concentration in order to decrease the costs associated with multiple lenders at the time of restructuring. Our second hypothesis concerns the monitoring costs and incentives of creditors to do monitoring when creditor rights are strong. With stronger creditor rights, the benefits of monitoring for creditors decline and therefore the manager has the incentive to form a more concentrated debt structure to lower the cost of financing in the absence of risk shifting incentives (Acharya et al., 2011).

To study these hypotheses, we empirically investigate how the strength of creditor rights in 46 countries impacts corporate debt–type structures. Our main source of data comes from the newly available database of S&P Capital IQ debt structures. Data for creditor rights come from Djankov et al. (2007). We find that, all else equal, the strength of creditor rights results in a 6% decline in debt-type concentration controlling for firm, macro and institutional determinants. We further find that in a cross section of firms, the influence of creditor rights on firms' debt- type structures is not uniform and it is stronger for firms with higher costs of bankruptcy or higher monitoring costs. This study confirms our two main hypotheses and provides insight about the mechanism through which creditor rights influence debt type concentration.

This study makes two important contributions to the literature. First, it adds to the literature of law and finance pioneered by La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998, 1999), by documenting how creditor rights impact the debt-type structures of firms. Second, this study extends the literature of debt-type characteristics (Colla, Ippolito, and Li, 2013; and Rauh and Sufi, 2010), by studying this variable across different countries and documenting the importance of creditor rights on firms' choices of debt type concentration.

In chapter 3 we address the second question of whether and how policy uncertainty affects the credit spreads of US corporate bonds. This question is timely, considering the already elevated and yet increasing concerns among investors about government policies and their role particularly in the post-crisis era. The government's role is to set the scene for the market participants to be engaged in efficient financial transactions. However, if the policy makers are not able to decide effectively they can cause investors to react to these uncertainties by decreasing their investments or by postponing their financial decisions. This chapter addresses the mounting debate about how politicians and policy makers influence financial markets and in particular the debt markets. Some recent examples of such effects include the recent prolonged Greek debt crisis and its contagion across Europe[2], as well as the governmental policies

[2] See for example http://www.nytimes.com/roomfordebate/2013/01/28/should-the-eu-stick-together/in-the-eu-political-unity-must-come-first

about consumer and federal debt in the United States. In the former, the inability of policy makers and politicians in tackling Greece's problem, and thus the resulting policy uncertainty was considered as one of the main contributors to the crisis. In the latter, disagreements between the approaches of the Democratic and Republican parties towards government debt and student loans add significant uncertainties to the debt markets. The impact of such policy uncertainties on corporate debt prices, and principally the corporate credit spreads is largely unknown. Therefore, we specifically ask: Do higher policy uncertainties translate into higher credit spreads? Second, if it does so, through what mechanism? Third, does the effect of policy uncertainties also have systematic effects?

Since policy uncertainty is not directly observable, we use our main measure of policy uncertainty to be the index of Baker, Bloom and Davis (2015), which incorporates the sentiment of investors about the degree of uncertainty in the market. We use monthly corporate bond data from TRACE and FISD databases from 2002 to 2012. We find that the increased policy uncertainty results in increased corporate credit spreads. We further control for the business cycles of the market to make sure that our results are not driven by changes in the fundamentals of the market. We also control for the other sources of uncertainties in the economy to be able to distinguish the influence of policy uncertainty on corporate credit spreads from other sources of uncertainties.

To understand through what channels policy uncertainty influences the corporate credit spreads of firms in the US, we study whether the influence of policy uncertainty on corporate credit spreads is homogenous across all firms. We find that for firms with more irreversible investment opportunities and more reliance on government spending, the influence of policy uncertainty on credit spreads is stronger and more significant. Moreover, we use a number of methods to handle the endogeneity in our study, including controls for macroeconomic, legal and political controls as well as using instrumental variables. Finally, we study how different components of credit spreads are affected by policy uncertainty. We find that the default premium and Bond-CDS basis both increase with policy uncertainty.

Our study extends the literature of determinates of corporate credit spreads (Campbell and Taksler, 2003; Ericsson, et al., 2009; Collin-Dufresne *et al.*, 2001; Elkamhi et al., 2012; Avramov et al., 2007; Chen et al., 2007) by documenting how policy uncertainty impacts corporate credit spreads in the US.

In chapter 4 (third essay) we address our third question that asks how large are the costs and benefits of credit-rating changes? We look at a lasting puzzle in the corporate finance literature that questions why firms have lower levels of debt in their capital structures compared with what the theory predicts. This phenomenon is referred to as the under-leverage puzzle, a term coined for the first time by Graham (2000). Particularly, we explore the costs of debt to firm value and document the existence of a certain set

of costs, namely the costs of credit rating deterioration. We study how large are the costs to firm value when credit rating deteriorates (improves) due to high levels of debt. Our findings contribute to the debate about the optimal levels of debt in corporate capital structures by showing that debt can be costlier to firm value than previously thought, and its costs can materialize much before distress or default.

One solution for the underleverage puzzle has been to account and measure costs prior to the point of default. The objective of this paper is to measure the costs and benefits of credit rating downgrades and upgrades to e firm value, and use them as identifiable and measurable costs of debt prior to default.

We study the impact of economic and financial credit rating deteriorations and improvements to firm value. By financial credit rating changes, we consider those changes in credit rating of a firm that occur because of a change in the amount of debt. Economic credit rating changes are independent of the level of debt and are mostly related to general economic conditions.

We find that the influence of a credit rating on firm value is asymmetric. Deteriorations in credit ratings result in higher absolute value changes in firm value than improvements in credit ratings. Since credit ratings can be anticipated in the market, we control for the leakage of information in the market by studying the influence of ratings implied from a credit rating model. We find that the influence of implied credit rating changes on firm value exist but are more muted than real credit rating changes in the market. Finally, we use an event study methodology to measure the relative costs and benefits of single and multiple credit rating changes. Using propensity score matching, we find that the cumulative costs of credit rating downgrades are about 15.1 %.

Chapter 2:

Creditor Rights and Corporate Debt Heterogeneity around the World

2.1 INTRODUCTION

The law and finance literature dating back to La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998, 1999) demonstrates the important connections between the country-wide strength of creditors' protection and firms' financing decisions. Although debt has historically formed a larger proportion of corporate capital structures in developed countries, the influence of legal determinants on debt markets has been studied less compared to that in equity markets (Esty and Megginson, 2003; Cho et al., 2014). The related literature concerning international debt markets and capital structure has focused predominantly on the impact of creditor rights on leverage and maturity (e.g., Bae and Goyal, 2009; Cho et al., 2014; Djankov, McLiesh, and Shleifer, 2007; Acharya, Amihud, and Litov, 2011). In this paper we study the relationship between creditor rights and a related but much less studied topic in capital structure, namely, the concentration of debt types in corporate debt structures. Specifically, we study whether and how legal risk, measured as the strength of creditor rights, affects debt-type concentration in a sample of firms across different countries. To our knowledge, our paper is one of the first to provide empirical results about cross-country debt structures and creditor rights.

There are many reasons that make an empirical study of debt-type structures timely. First, while a large body of literature has so far provided theoretical explanations for variations in concentration of debt structures (Diamond, 1991 and 1993; Park, 2000; Bolton and Freixas, 2000), empirical studies of debt structure are rare due mostly to the related data becoming available only recently. Second, although the choice of debt type by firms has been at the center of empirical corporate finance, unavailability of data has limited such studies to the choice among public, private and bank debt. Finally, Rauh and Sufi (2010) show that ignoring debt-type variations can lead to misleading results about corporate capital structure variations.

Our study extends to an international level the important studies by Colla, Ippolito, and Li (2013) and Rauh and Sufi (2010), who address debt structures for publically traded U.S. firms. Rauh and Sufi (2010) were the first to document that about a quarter of their sample of U.S. public firms experience significant year-to-year changes in their debt compositions while they show no significant changes in their debt amounts. In a related study, Colla, Ippolito, and Li (2013) find that more than 85% of their sample of U.S.

firms specialize or use exclusively one type of debt instrument. These studies suggest a number of unanswered questions concerning debt structure at the international level. Although these studies provide valuable insight on the behaviour of corporate debt structures, important questions remain unanswered. Particularly, while the substantial influence of country-wide institutions on capital structures is well documented, there is no evidence on whether cross-country institutional and legal differences impact the choice and number of different debt types that a firm employs in its capital structure. Specifically, does the strength of creditor rights protection increase or decrease the concentration of debt instruments employed by firms in different countries?

Theoretically, we predict that firms change their debt-type concentration in response to stronger creditor rights. As legal risk increases, managers face costlier economic default (Houston et al., 2010). This in turn can induce firms to increase debt-type concentration (i.e. fewer number of debt types) to mitigate the cost of reorganization associated with multiple debt-type holders (Esty and Megginson, 2003; Qian and Strahan, 2007). Additionally, changes in the level of creditor protection impacts creditors' monitoring incentives. In this sense, stronger creditor rights lower creditors' monitoring benefits, resulting in reduced monitoring intensities and thus higher expected rates of default (Houston et al., 2010; Colla et al., 2013). At the same time, strong creditor rights make default costlier for shareholders and thus reduce a firm's risk-taking incentives. Therefore with stronger creditor rights, managers can provide higher monitoring incentives for creditors by ex-ante forming more concentrated debt structures to lower the costs of financing in the absence of risk shifting incentives (Acharya et al., 2011).

We test these hypotheses using the debt type structure of a sample of firms across different countries. As legal systems are highly persistent over time, a cross-country study provides the necessary cross-sectional heterogeneity of legal systems and particularly of creditor rights. We use data from the new database on firms' debt structures across the world available through S&P Capital IQ to examine the debt structures of public firms in 46 countries. We categorize different forms of debt into the seven distinct categories of commercial paper, capital leases, lines of credit, long-term debt, notes, trusts and other debt types. Our final panel data set contains 138,801 firm-year observations for 25,700 unique firms over the period 2001 to 2013.

To address unobserved heterogeneity in our data, we use a number of econometric methods. Importantly, with the existence of time-invariant country-specific determinants as well as time-varying firm-level determinants of debt structure, we employ a recently developed econometric method called the correlated random effect (CRE) following Blundell and Powell (2003), Altonji and Matzkin (2005) and Wooldridge (2009). This specification enables us to estimate simultaneously the constant and time-varying regressors with random and fixed effect estimations, respectively.

Our findings indicate that stronger creditor rights protection induces firms to form more concentrated

debt structures. We use two different indexes to measure the level of concentration in corporate debt structures and show that our results are robust to this choice. To account for the possible effects of omitted variables on our results, we control for a wide range of cross-country institutional differences as well as macroeconomic and cultural determinants. Moreover, we use instrumental variables to deal with other possible endogenous effects.

All else held equal, a one standard deviation improvement in the strength of creditor rights reduces debt-type heterogeneity by 6%, after accounting for firm, macro and institutional-level determinants. Interestingly, this negative relation between the strength of creditor rights and debt-type heterogeneity can be replicated using each of the components of the creditor rights index, as introduced by Djankov et al. (2007).

Next we explore whether all firms in different countries are equally affected by the strength of creditor rights. We further test our hypothesis in cross sections of firms and provide two separate reasons why the impact of the strength of creditor rights on a firm's debt-type concentration may not be homogenous. First, if bankruptcy is not equally costly for all firms in the economy, then we should expect some cross-sectional variation in their reluctance to use a concentrated debt structure when creditor rights in the country are stronger. Second, we expect that the debt-type concentration of firms with higher monitoring costs is more sensitive to changes in the strength of creditor rights. We confirm the above mechanisms by studying the heterogeneous impact of the level of creditor rights on firms with different expected costs of default and expected monitoring costs. Our findings provide novel insights into the mechanisms through which variations in creditor rights affect corporate debt structures. All else held equal, we confirm that firms with higher expected bankruptcy or monitoring costs, that are operating under stronger creditor rights regimes are more likely to form more concentrated debt structures in order to decrease the high costs associated with multiple debt types at default or to give more incentives to creditors to monitor.

Our paper makes three important contributions to the current literature. First, we extend the literature on the impact of legal institutions on corporate finance (e.g., La Porta et al., 2000, 2002; Demirguc-Kunt and Maksimovic, 1998, 1999; Qian and Strahan, 2007; Bae and Goyal, 2009; Benmelech and Bergman, 2011; Cho et al. 2014; Houston et al., 2010) by showing how different creditor rights protection regimes can influence corporate debt structures across countries. Second, our study extends the literature on the principal-agent relationship and its implications for capital structure composition by emphasizing the importance of conflicts of interest among different debt-type holders and how these potential conflicts may give incentives to managers to change the optimal debt structures of their firms. Finally we contribute to the literature of debt-type characteristics (Colla, Ippolito, and Li (2013) and Rauh and Sufi (2010) and extend it to an international level, by studying the influence of legal characteristic and creditor rights on the firms' choice of debt structures.

The remainder of the paper is organized as follows. Section 2.2 presents the theoretical background that leads to our main hypotheses. Section 2.3 presents the data and summary statistics. Section 2.4 presents empirical results, including controls for omitted variables, use of instrumental variables, alternative sample compositions and estimation methods. Section 2.5 studies the cross-sectional effects of creditor rights on firms with different characteristics and sheds light on our proposed mechanisms. Section 2.6 concludes.

2.2 BACKGROUND AND HYPOTHESES

There is considerable variation across countries regarding the rights granted to creditors. For example, it is widely documented that civil law and common law countries vary considerably in their creditor protection. Creditor rights are predominantly concerned with the resolution of disputes between creditors and borrowers in distress or default. With better creditor protection the expected costs in default are lower for lenders but higher for equity-holders and managers. Schwartz (1997), Acharya et al. (2011) and Vig (2014) suggest that since such state-wide dispute resolution procedures, i.e. laws and regulations, apply to all firms uniformly, they may lead to market inefficiencies.

The literature shows that stronger creditor rights influence creditors and borrowers differently. For creditors, better creditor protection increases expected recovery rates (Davydenko and Franks, 2008), improves access to collateral and reduces the deadweight costs associated with secured debt (Vig, 2013). Moreover, creditors are less concerned about managerial risk-taking and wealth transfers to shareholders with stronger creditor rights (Jensen and Meckling, 1976; Klock, Mansi and Maxwell, 2005). This motivates possible lenders with incentive to provide credit to more borrowers, thus leading to increased supply of credit in the economy (La Porta, Lopez, Shleifer and Vishny, 1998)

From borrowers' side, stronger creditor rights increase managers and firms' costs in the event of bankruptcy, and therefore can shrink the demand for credit (Houston, Lin, Lin and Ma, 2010). This leads to more complex expectations about how creditor rights influence firm behavior and invokes important policy-related questions regarding the optimal strength of creditor protection in an economy (Acharya, Amihud, Litov, 2011). As Acharya et al. (2011) suggest, stronger creditor rights in the event of default can lead to inefficient liquidation and damage shareholders by eliminating their continuation option. Houston et al. (2010) document that stronger creditor rights increase the firm and management costs associated with bankruptcy. The component of creditor rights that allows replacing the manager during the reorganization can even impose private costs to the managers. Furthermore, when creditor rights impose priority of creditors over the liquidation proceeds, shareholders expect even higher costs at default.

The bulk of evidence in the literature shows that the disincentive of debt financing to the firm and manager due to the increased costs of default, predominantly determines the influence of stronger creditor rights on corporate decisions. The related bankruptcy literature (e.g. Aghion, Hart and Moore, 1992; Hart et al., 1997) emphasizes that strong creditor rights can lead to ex-post inefficiencies in liquidation. In this regard, Rajan and Zingales (1995) argue that stronger creditor rights incentivise lenders to penalize managers and shareholders in the case of distress and in turn incentivize the managers to avoid distress. Adler (1992) argues that with stronger creditor rights, managers have incentives to reduce risk ex ante in order to avoid insolvency. Manso (2011) suggests that stronger creditor rights can adversely impact innovation since managers become reluctant to take higher risks as they may get penalized more severely in case they fail. Managers may forego risky profitable investments or engage in value-destroying diversifications to reduce risk and avoid the high costs of default in response to stronger creditor rights and stronger creditor rights can lead to deadweight costs to the economy (Acharya et al., 2011).

In corporate financing studies, Acharya, Sundaram, and John (2011) show that stronger creditor rights reduce corporate leverage. In response to improvements in US creditor right laws, Adler, Capkun and Weiss (2007) show that firms delay default and hence waste assets considerably. A variety of other studies show that creditor rights impact capital structures and corporate financing decisions. Comparing the bankruptcy codes in the US and UK, Acharya, John and Sundaram (2011) conclude that creditor protection codes significantly influence leverage across countries. Consistent with this notion, Vig (2013) shows that improvements in creditor rights in India result in the reduction of debt financing activities of firms. Davydenko and Franks (2008) study the recovery rates for the UK, Germany and France and find that variations in bankruptcy codes affect financing contracts to compensate for legal deficiencies.

2.2.1 Hypotheses

We hypothesize that legal risk affects the concentration of corporate debt structures. Managers and shareholders respond to stronger creditor rights environments by ex-ante choosing more concentrated debt structures. Since more concentrated debt structures reduce the ex-ante costs of bankruptcy to the firm, more concentrated debt structures are a rational response to the increased costs of default associated with stronger creditor protection laws.

Hypothesis 1- Bankruptcy Costs: *All else held equal, firms use more concentrated debt-type structures in countries with higher creditor rights to reduce renegotiation and liquidation costs to the firms' owners associated with multiple debt types.*

The impact of more concentrated debt structures on the costs of default is well documented in the literature. According to Jensen (1976) and Myers (1977), bankruptcy costs are positively influenced by conflicts of interest between debt holders and shareholders. Welch (1997), Hackbarth and Mauer (2012) and Colla et al. (2013) show that increased bankruptcy costs are also influenced by conflicts of interest between different groups of debt holders. Bolton and Scharfstein (1996) and Gertner and Scharfstein (1991) provide a theoretical setting in which firms, depending on their fundamentals, minimize the expected costs of bankruptcy by borrowing from fewer sources. In these studies, a more concentrated debt structure facilitates *faster* and *cheaper* restructuring. Consistent with these predictions, Gilson, John and Lang (1990) and Asquith, Gertner and Scharfstein (1994) document that more heterogeneous debt structures increase the time and costs of restructuring. Ivashina, Iverson, and Smith (2011) conclude that a fewer number of creditors facilities the restructuring process under Chapter 11, decreases the liquidation probability and leads to higher recovery rates. Diamond (1991), Rajan (1992) and Berglöf and von Thadden (1994) suggest that debt structure can impact renegotiation costs for distressed firms.

Overall, the evidence reported in the literature implies that more concentrated debt structures facilitate restructuring and lead to lower costs of default for firms and shareholders if all else is held equal. This proposition is partially confirmed by the findings of Esty and Megginson (2003) and Qian and Strahan (2007) that higher creditor rights are associated with more concentrated syndicated loans. In this paper, we propose that in higher creditor rights regimes firms choose more concentrated debt-type structures, i.e. reduce debt-type heterogeneity, to decrease the costs to managers and shareholders at default.

Hypothesis 2- Monitoring Incentives: *All else held equal, managers choose more concentrated debt structures in countries with stronger creditor rights to give more incentives to creditors to monitor.*

Another mechanism through which creditor rights affect the corporate debt structure is through their effect on creditors' monitoring activities. The literature shows that asymmetric information and conflicting incentives between managers and creditors can incentivize managers to engage in asset substitution activities, and shift risks to the debt holders (Green and Talmor, 1986; Mauer and Sarkar, 2005; Basak, Pavlova, Shapiro, 2012). One way to mitigate this problem is by borrowers monitoring firm activities. Since monitoring is costly, creditors trade-off the costs and benefits of monitoring to decide the optimal level of monitoring intensity.

With stronger creditor rights, creditors incur fewer losses in the event of default and borrowers incur higher costs. The decline in the expected loss in default to creditors, necessarily reduces their benefits of monitoring and thus leads to reduced monitoring intensities (Colla et al., 2013). The decline in the level of monitoring is therefore a rational reaction of lenders to favorable changes in the legal system. Houston et

al (2011) show that reduced monitoring intensity can lead to a higher probability of default.

Although stronger creditor rights reduce the incentives of creditors to monitor, the literature shows that it motivates the manager to take smaller investment risks. Acharya et al., (2011) document that in countries with stronger creditor protection, firms are more likely to engage in diversifying acquisitions that are value-destroying, in order to acquire targets with higher recovery rates and lower cash flow volatilities. In other words, reductions in the monitoring incentives for creditors in response to stronger creditor rights do not result in higher risk-taking behavior by managers. This well-documented behavior may indicate that managers are concerned more about increased re-structuring and default costs due to stronger creditor rights, than the opportunity for risk-shifting provided by a decline in the monitoring incentives for creditors.

Therefore, stronger creditor rights influence the optimal debt structure decisions of managers by inducing them to adopt more concentrated debt-type structures. This is beneficial for the managers since it increases the monitoring incentives of creditors and decreases the costs of debt financing due to the low risk-shifting incentives of managers. It also facilitates re-contracting at the time of default when creditors are strong. According to Shleifer and Vishny (1986), Burkart, Gromb, and Panunzi (1997), Chen, Harford, and Li (2007), we expect that firms react to the diminished monitoring incentives of lenders by choosing more *concentrated* debt structures to enhance monitoring effectiveness. This confirms the findings of Adler (1992) that managers tend to avoid insolvency ex-ante by reducing their risk-taking given stronger creditor rights.

The related literature provides evidence for this reaction. In his seminal paper, Park (2000) documents that an optimal debt structure should maximize the incentives of lenders to monitor by delegating monitoring to a single senior claimholder. Using syndicate loan data, Sufi (2007) shows that the syndicate's lead bank maintains a larger portion of the syndicated loan and thus forms a more concentrated loan structure when lending banks require more intensive monitoring. Recently, Colla et al. (2013) document that firms encourage monitoring by reducing debt-type heterogeneity. Overall, the literature asserts that more concentrated debt structures provide creditors with stronger incentives to monitor.

2.3 DATA AND SUMMARY STATISTICS

Our data are compiled from a variety of sources for country-specific, legal, institutional and firm-level variables. In this section, we provide details of the data sources and descriptions of the related variables and leave details of their construction to Appendix 1.

2.3.1 Creditor Rights Index

We use the creditor rights index that is introduced to the literature by La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997), and Djankov, McLiesh, and Shleifer (2007). This index has four components, each of which is a dummy variable that equals one if certain lender rights are embodied in a country's laws and regulations and zero otherwise. The index ranges between zero and four with zero representing the lowest creditor-rights index and four the highest. The first index component concerns whether the consent of creditors is required for firm decisions for example when the borrowing firm files for reorganization, or decides on a minimum dividend payment.

The second component concerns the seizure of collateral by creditors and specifically addresses whether secured creditors can appropriate collaterals upon the approval of a reorganization petition. This applies when courts do not impose asset freezes or automatic stays.

The third component concerns the priority of payments from liquidation proceeds. The related dummy here equals one if secured creditors have priority over these proceeds. The last component addresses when the incumbent manager is removed during the reorganization process so that the firm is controlled by an alternative administrator.

The initial creditor-rights index first introduced in La Porta et al. (1998) was later updated by Djankov, McLiesh, and Shleifer (2007) to include more recent changes across 129 countries. We use the 2002 values of this index in our analysis, following Djankov et al. (2007) and Brockman and Unlu (2009). Holding the index constant over time is unlikely to lead to biases due to the high level of persistence in this index as discussed in Djankov et al. (2007), Brockman and Unlu (2009), and Cho et al. (2014).[3]

2.3.2 Firm-level Data

Our primary database for firm-specific variables is the Compustat Global database which covers about 130 countries and 45,000 active firms.[4] We use the Compustat North America databases for firm data for firms in the U.S. and Canada. To construct market-related variables such as book to market and market equity, we obtain market equity data for non-U.S. firms from the Compustat Security Daily database. We convert the financial data across all countries into U.S. dollars using the World Bank Currencies database.[5]

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[3]To illustrate, Djankov et al. (2007) find that only 13 out of 129 countries experienced changes in creditor rights during 1991 to 2004.

[4] Firms in countries other than the U.S. and Canada tend to be under-represented in this database.

[5] Compustat provides two location indicators, location of the headquarters (LOC) and the location in which the company is incorporated (FIC). Our main location indicator is the latter. However, this choice has little influence on our results as the two location indicators differ for only 711 firms in our primary compiled dataset of 35,898 unique firms.

The main source of data for debt structure is the CapitalIQ Debt database which provides such data for more than 60,000 public and private firms globally from 2001 to 2013. CapitalIQ provides data on debt attributes such as debt type and seniority, maturity, and the issued currency. The debt types are classified at two levels: the broad first level (descriptiontext) and the more detailed second level (capitalstructuredescription). Combining these two levels provides a large number of possible debt types. We recognize the following seven distinct and mutually exclusive debt types in this database: Capital Leases, Commercial Papers, Lines of Credit, Long-term Debts, Notes, Trusts and Other Debts. We merge the aggregate annual value of each debt type with the data from the Compustat database. In addition to firm-specific debt types, we are also interested in the number of debt types in each country.

We use firm-level explanatory variables similar to those used by Colla et al. (2013). These variables whose construction in detailed in Appendix 1 include firm size, market to book ratio, profitability, tangibility, maturity, cash flow volatility and leverage. To obtain the final dataset, we remove utilities (SIC Codes from 4900 to 4949) and financial firms (SIC Codes from 6000 to 6999), and delete firm-years with missing Total Assets and leverage ratios outside the closed unit interval as in Lemmon, Roberts, and Zender (2008). A reason for doing so is that we require that all the explanatory variables be non-missing in the multivariate regressions. The data are winsorized at the 1% level to minimize the effects of outliers.

2.3.3 Country-level Variables

Macroeconomic proxies for the level of development: As measures of the level of a country's economic development, we use per capita GDP, growth in per capita GDP, inflation and per capita GNI (Gross Net Income) from the World Bank databases. Countries with higher per capital GDP tend to have more developed financial markets. Inflation shows the consistency between fiscal and monetary policies as relevant imbalances may lead to an increased cost of financing through added inflation risk and its perturbation effects. The effect of inflation on the overall term structure can lead to changes in the optimal maturities of corporate debt structures and reallocations among its various debt types.

The behavior of borrowers in developed and developing countries are different. Generally, firms in developed countries are more mature, with greater access to a larger pool of financial assets. To account for the differences in markets and borrowers across developed and developing countries, we use the World Bank's data and categorizations of high, medium and low-income countries. According to the World Bank, low-income countries have less than $1,045 in per capita GNI in U.S. dollars, middle-income countries have between 1,045 and 12,746 in per capita GNI, and high-income countries have more than12,746 in per capita GNI.

Sovereign rating: Increases in sovereign ratings increase overall market risks and can raise the yields for foreign borrowings. Keck, Levengood, and Longfield (1998) find that practitioners add sovereign risk

premiums to risk-adjust their discount rates. Higher country risk may also be related to the levels of corruption and weak institutions as argued by Durbin and Ng (2005). We convert the alphabetical ratings from the Fitch Sovereign Rating database to numerical equivalents where a rating of AAA equals 1 while a rating of D equals 29. On this scale, each notch change in a credit rating adds or subtracts one to or from the numerical equivalent. These monthly ratings change at different frequencies, depending on national or global events and conditions. We hold these rating equivalents constant over months where no credit news or updates are available, and annualize this measure by taking annual averages of the monthly values.

Financial development: To capture financial development, we use the ratio of total private domestic credit to GDP (Qian and Strahan, 2007), and also the ratio of liquid liabilities to GDP that essentially measures financial depth (King and Levine, 1993). The selection of leverage and debt types may be affected by the level of financial market development. Specifically, a greater availability of funds may induce firms to become more leveraged and consequently employ a wider variety of debt types in their external financing decisions.

Origins: We include legal origins in our study according to La Porta et al. (1997, 1998), and Qian and Strahan (2007). These studies show that investor protection rules and the quality of law enforcement are systematically influenced by the legal origins of countries. We consider four distinct legal origins; namely, English, French, German and Nordic. Except for the English legal system which is common law, the remaining three are civil law systems. Studies find that the magnitude of investor protection also varies in response to changes in legal systems. For example, Beck et al. (2003) find that the English legal system is more efficient in protecting the rights of creditors since essentially it is designed to protect individual property owners against expropriation by the crown. In contrast, the French civil law was developed mainly to unify the legal system and stabilize the control of the state over courts (e.g., Hausmann and Rodrik, 2003; La Porta et al., 1998; Easterly and Levine, 2002). The data regarding legal origins comes from La Porta et al. (1998) and Qian and Strahan (2007). La Porta et al. (1998) argue that common law countries offer better legal protection for lenders. Hoffman (1998, pp. 76-77) argues that common law systems provide better flexibility in the types of collaterals that can be seized in the event of default and also on the forms of liens that can be applied to assets. Coffee (2000) shows that common law countries deliver higher flexibilities in addressing new and unexpected cases, while civil law countries are more constrained by the set of currently established laws.

2.3.4 Measure of Debt-Type Heterogeneity

As a measure of debt-type heterogeneity we use a normalized Herfindahl-Hirschman index (HHI) used by Colla et al. (2013) in which the sum of squares of the value of each debt type is divided by the total

value of debt in a firm's capital structure.[6] When this index is at its minimum value of zero, the firm has the lowest debt-type heterogeneity (highest debt-type heterogeneity) as it has equal proportions of each of the seven debt types in its capital structure. When this index is at its maximum value of one, the firm has the highest possible Heterogeneity since it "specializes" in only one debt type. To check the robustness of our results to an alternative measure of debt-type heterogeneity we also use another measure of debt-type heterogeneity, $SP90_{i,t}$, which is a dummy variable that equals one if a debt type constitutes more than 90% of a firm's debt structure and zero otherwise (Colla et al., 2013).

Figure 2.1 depicts the median heterogeneity index values across different countries. As this figure shows, a typical firm in Croatia and Turkey exhibits the highest debt type Heterogeneity while one in Portugal, Malaysia and Sri Lanka exhibits the lowest debt type Heterogeneity.

[Please place Figure 2.1 about here.]

2.3.5 Summary Statistics

Table 2.1 briefly describes our data. Firms are highly specialized in a few debt types, as the mean Heterogeneity value is as high as 71%. We also observe that almost half of the firms across countries use a single debt type extensively. The mean value of the *SP90* variable suggests that 45% of the firms have more than 90% of their debt in a single debt type. Our sample covers the full range of possible creditor rights from 0 to 4, with a mean (median) index around 2 (1.89). Firm-level variables show moderate variations. Size and the market to book ratio have the highest variations with standard deviations above 2, while profitability, tangibility, cash flow volatility and book leverage have standard deviations below one.

[Please insert Table 2.1 about here.]

Table 2.2 reports the average percentages of each debt type, average Heterogeneity index, number of unique debt types, average country-level indicators and average information-sharing factors for the countries in the sample. Countries vary largely in their debt combinations and their number of different

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[6] Formally, we compute this index in the following two steps. First, we compute the total sum of squares, $SS_{i,t}$ for each firm in every year, as

$$SS_{i,t} = \left(\frac{CommPaper_{i,t}}{TotDebt_{i,t}}\right)^2 + \left(\frac{CapitalLease_{i,t}}{TotDebt_{i,t}}\right)^2 + \left(\frac{LineofCredit_{i,t}}{TotDebt_{i,t}}\right)^2 + \left(\frac{LongTerm_{i,t}}{TotDebt_{i,t}}\right)^2 + \left(\frac{Notes_{i,t}}{TotDebt_{i,t}}\right)^2 + \left(\frac{TrustDebt_{i,t}}{TotDebt_{i,t}}\right)^2 + \left(\frac{OtherDebt_{i,t}}{TotDebt_{i,t}}\right)^2$$

Then HHI Heterogeneity index is obtained from $Heterogeneity_{it} = \frac{SS_{i,t}-(1/7)}{1-(1/7)}$

debt types at the aggregate level. The United States, Japan, China, Australia and United Kingdom use the largest set of contract forms, while Morocco, Panama, Zimbabwe, Hungary and Kenya use the lowest number of debt contract types. Zimbabwe, New Zealand, Argentina, Croatia and Turkey have the highest debt-Heterogeneity indexes, while Portugal, Malaysia, Sri Lanka, Colombia and India have the lowest debt-Heterogeneity indexes. The relation between a country's economic and financial development status is not closely aligned with its degree of debt-type heterogeneity.

[Please insert Table 2.2 about here]

A possible limitation of the data used to construct Table 2.2 is data coverage. Our data may not capture the whole set of debt contracts that exist in a given country particularly if firms in that country are underrepresented in the databases used herein. This occurs more frequently for firms from countries with low economic development. We attempt to deal with this possibility by examining groups of countries based on their development statuses.

Table 2.3 reports the correlations between the main explanatory variables. The first column of numbers provides some indicative evidence about the influence of the explanatory variables on debt-type heterogeneity. GDP, inflation, and public and private registries are all negatively correlated with the HHI debt-type Heterogeneity index while *SP90*, creditor rights, cash flow volatility, market to book ratio, and sovereign rating are positively correlated with the HHI debt-type Heterogeneity index. Since the main variable of interest, creditor rights, is not highly correlated with debt-type Heterogeneity and the other determinants, a possible endogeneity effect may not be a major concern. Nevertheless, we still examine this possibility later in the paper.

[Please insert Table 2.3 about here]

2.4 EMPIRICAL RESULTS

Our regression estimation strategy begins with a pooled OLS specification, a random-effects specification and the correlated random-effects (CRE) specification when *Heterogeneity* is the dependent variable. We subsequently use the CRE specification as our default estimation specification since CRE is a consistent method for the estimation of both time-varying and slow-moving (or time-invariant) determinants. To deal with possible endogeneity problems, we control for macroeconomic as well as institutional and political features of each of the countries. Moreover, we use the instrumental variable approach and two stage least square estimations using legal origins and ethnolinguistic fractionalization as instruments. We also test the robustness of our results to alternative subsamples and specifications.

2.4.1 Estimation Method and Unobserved Heterogeneity

A usual problem in cross-country panel-data studies is the existence of unobserved heterogeneity. From an econometric perspective, this problem can make OLS estimates problematic. As this problem can be induced by independent variables that are observable or unobservable (i.e., not included in the regression model), we have three different cases based on our assumption about the error terms.

In Case 1, a fixed-effects specification becomes appropriate if the error terms are correlated with the regressors. A problem with using fixed effects in our setting is that the institutional variables are mostly time-invariant and therefore a fixed-effects model fails to capture the effect of these variables. While a fixed-effects model allows the marginal effects to be identified, it is only limited to the time-varying effects since a large set of country-specific factors rarely change over time.

In Case 2, the unobserved heterogeneity is distributed independently of the regressors. In this case, random-effects estimates with GLS are commonly used that are essentially more efficient than OLS estimates. A problematic feature in random-effects models is the assumption that country effects are uncorrelated with regressors. Therefore such estimates are not consistent if the true model is a fixed effects.[7]

Selecting either of the above estimation methods comes with some costs to results. Studies in the related literature differ in their selections. For example, Bae and Goyal (2009) uses random-effects models, while Fan, Titman, and Twite (2012) and Qian and Strahan (2007) use fixed-effects models. We also use the Correlated Random Effects (CRE) method of Blundell and Powell (2003), Altonji and Matzkin (2005) and Wooldridge (2009). This approach significantly reduces the costs of either of the above models while also capturing the correlation effects from both observable and unobservable variables. Our base regression model, using a correlated random effect (CRE) estimation method is:

$$Heterogeneity y_{it} = \eta_t + X_{it}\beta + h_i + u_{it}, \quad t = 1, \dots, T \tag{2.1}$$

where the X_{it}vector contains all time variant or invariant explanatory variables, and the composite error v_{it} is serially correlated and given by:

$$v_{it} = c_i + u_{it} \tag{2.2}$$

Where c_i is the unobserved heterogeneity and u_{it} is the error term. We can rewrite Equation (2.1) by unbundling its covariates as

[7] For more of a discussion on this estimation method, please refer to Baltagi (2008), Wooldridge (2010), Hsiao (2014) and Bae and Goyal (2009).

$$Heterogeneity_{it} = g_t\theta + z_i\delta + w_{it}\gamma + h_i + u_{it} \quad (2.3)$$

where g_t captures the time-effect, z_i accounts for the time-invariant variables, w_{it} contains variables that change both across firms or countries and over time, and h_i is the unobserved heterogeneity. Specifically, z_i in our base regression contains institutional controls that are mostly constant, w_{it} contains size, market to book, profitability, tangibility, cash flow volatility, and leverage; and g_t contains the log of GDP per capita, inflation, and the sovereign rating. This approach allows us to have a combination of fixed and random effects. Thus, the unobserved heterogeneity h_i is a combination of a fixed variable, and a linear function of the regressors. More formally,

$$E(h_i|\, X_{i1}, X_{i2}, \ldots, X_{it}) = E(h_i|\, \bar{X}_i) = \mu + \bar{X}_i\, \vartheta \quad (2.4)$$

where $\overline{X}$ is the vector of the means of regressors over the T periods (Mundlak, 1978; Chamberlain, 1980, 1982). From this equation, a firm-specific fixed effect is obtained using the following decomposition

$$h_i = \mu + \bar{X}_i\, \vartheta + \alpha_i \quad (2.5)$$

where α_i captures the fixed effect. Therefore, Equation (2.1) can be rewritten as

$$Heterogeneity_{it} = X_{it}\beta + \mu + \overline{X_i}\, \theta + v_i \quad (2.6)$$

where

$$v_{it} = \alpha_i + u_{it} \quad (2.7)$$

Therefore, the above CRE model can be interpreted as a combination of a fixed- and a random-effects model. Using this model, we can obtain the fixed-effects estimates for θ and γ. The model is estimated using a feasible GLS. Taking the dimension of the v_i as $T * 1$, then the covariance matrix will have a random-effects structure given by

$$\Omega = E(v_i v_i') = \begin{pmatrix} \sigma_\alpha^2 + \sigma_u^2 & \cdots & \sigma_\alpha^2 \\ \vdots & \ddots & \vdots \\ \sigma_\alpha^2 & \cdots & \sigma_\alpha^2 + \sigma_u^2 \end{pmatrix} \quad (2.8)$$

2.4.2 Does the Level of Creditor Rights Influence Debt-type Heterogeneity?

In this section, we present panel regression results on the determinants of the number of debt types used by international firms in 46 countries from 2001 to 2012. Including all the controls, our results are robust and we continue to find that greater creditor rights increase debt-type heterogeneity (reduce heterogeneity).

In our first set of regressions, we study the effect of creditor rights on each measure of debt-type heterogeneity; namely, $Heterogeneity_{it}$. As discussed previously, $Heterogeneity_{it}$ values of 0 and 1 represent the lowest and highest degrees of heterogeneity. Our generic regression model is

$$Heterogeneity_{it} = g_t\theta + z_i\delta + w_{it}\gamma + h_i + t\,\varphi + u_{it} \tag{2.9}$$

where the w_{it} are the firm-specific variables including size, market to book, profitability, tangibility, cash flow volatility, and leverage (e.g., Colla et al., 2013); the g_t are time-varying country-specific variables including inflation, sovereign rating, developed dummy, and information sharing; the z_i are time-invariant regressors including the common law dummy and creditor rights; and t captures the time effect.

Before presenting the regression results using the various specifications, we depict the fitted values from a basic OLS regression of debt-type heterogeneity on the creditor-rights index in Figure 2.2. This figure provides preliminary evidence about the relationship between creditor rights and debt-type heterogeneity by using the average country-wide debt concentration (specialization) and the strengths of creditor rights index as the dependent and independent variables, respectively. As the graph suggests, improvements in creditor rights is associated with lower debt-type heterogeneity (higher specialization). New Zealand, Zimbabwe, Panama, U.K. and Kenya have strongest creditor rights, whereas France, Columbia, Mexico and Peru have the weakest. The graph depicts that the average debt-type heterogeneity of the latter group clearly stays below that of the former. The fitted line suggests a positive relation between debt concentration and the strength of creditor protection.

[Please insert Figure 2.2 about here]

We report the results using OLS and random-effects specifications in Table 2.4, and the CRE specification in Table 2.5. These two tables make a comparison possible across these three specifications, particularly since this paper is one of the few to incorporate a CRE specification. Based on the results reported in Table 2.4, debt-type heterogeneity is negatively and highly significantly related with the creditor-rights index in both specifications. The estimates for the other firm- and country-specific

determinants are also similar across both estimation specifications of random effects and CRE. Debt-type heterogeneity decreases with an increase in the firm-specific variables other than the market to book ratio. Debt-type heterogeneity is also lower for high income countries and countries with English legal origins, and is not significantly associated with inflation, sovereign rating or information sharing.

[Please insert Tables 2.4 and 2.5 about here]

Table 2.5 reports the regression results with debt-type heterogeneity as the dependent variable when estimated using the CRE specification. In a univariate model, there is a negative and significant relation between creditor rights and debt-type heterogeneity. This table shows that a firm's debt-type structure becomes less heterogeneous as the strength of creditor rights improves. The negative and highly significant relation in the univariate case of column 1 remains so after controlling for firm-specific (column 2) and other macroeconomic and legal determinants in column 3. The magnitudes and significances of other firm and country-specific determinants differ moderately with those reported earlier in Table 2.4. Firms that are larger and more levered, and firms located in developed countries tend to use more types of debt. In columns 4 through 7, we study the influence of each component of the creditor rights index on corporate debt-type heterogeneity. Based on these four columns, improvement in each of the creditor rights components is associated with reduced debt heterogeneities, and the effects are large and significant. We also note that the effects of the four creditor rights components are robust to firm, macro and legal controls. This result is important as it indicates that the influence of creditor rights on debt-type heterogeneity is the sum of the impact of all its components, while each of these components can separately drive our results.

Since the CRE specification accounts for possible omitted variable biases, the results reported in Table 2.5 are more reliable compared to those reported in Table 2.4. Nevertheless, the estimates reported in both tables agree on the direction and the magnitude of the association between debt-type heterogeneity and our main variable of interest, namely, the creditor rights index. In the rest of the paper, we only report the estimates from the CRE specification for brevity.

2.4.3 Robustness Test: Alternative Measure of Debt-type Heterogeneity

In this section, we investigate whether our results are robust to the choice of an alternative measure of debt specialization. For this purpose, we use a specialization index introduced by Colla et al. (2013). This index is a binary variable that equals one when a single debt type has more than a 90% weight in a firm's debt structure in any given year, and is zero otherwise. Therefore, when this index equals 1 it indicates that the firm is highly specialized in its debt structure. We expect to observe a positive relation between

the strength of creditor rights and this alternative index, if stronger creditor rights lead to more concentrated debt structures. We refer to this index as SP90 throughout the paper.

In Table 2.6, we examine the robustness of our results using this index as the dependent variable. Here we use a Probit model due to the binary nature of the dependent variable. Other controls remain the same including firm-level controls in column 2, and firm, macro and legal controls in column 3. Columns 4 through 7 report the effects of each of the creditor rights components on the SP90 index of debt-type heterogeneity. As expected, the creditor rights index and each of its components have positive and significant relations with SP90. The coefficients of the creditor rights index and its components are consistent with our findings reported earlier in Tables 2.4 and 2.5.

[Please insert Tables 2.6 about here]

Other determinants also have consistent signs with those in Tables 2.4 and 2.5. Larger, more leveraged firms, with higher profitability, leverage and maturity have more heterogeneous debt structures. The effect of each index component on debt-type heterogeneity remains large and significant. Results in this section confirm our original findings that firms in countries with stronger creditor rights protection form more concentrated debt structures.

2.4.4 Robustness Test: Omitted Variables

2.4.4.1 Omitted institutional variables

The main challenge in interpreting our baseline results causally is the possibility that the creditor rights variable may capture the effects of a country's institutional settings, and at the same time choice of different debt structures may also be under the influence of country's such institutional determinants. To address this concern, we examine whether the association of debt-type heterogeneity with creditor rights is robust to the inclusion of country's legal and political controls.

While controlling for legal origins in our base regressions partially addresses this concern, in this section we extend such controls by including determinants from the economic literature on political and legal institutions. This literature particularly asserts the importance of property rights and contract enforcement in determining cross-country economic outcomes. Thus, these variables are conceptually related to the strength of property rights (Acemoglu and Johnson, 2005). Importantly, Acemoglu, (2003 argues that these institutional indicators cannot be substituted by the legalities of creditor rights protections due to largely different natures of contracting and enforcement institutions. The determinants we include in this test include law and order, corruption, bureaucratic quality, efficiency of debt

enforcement, contract viability, contract enforcement costs and time, depth of creditor information, strength of legal rights, property rights and information sharing. We describe the relevance and construction of these determinants below.

Law and order: This variable is measured on a scale from 0 to 6, where higher values mean stronger law and order (Bae and Goyal, 2009). This index, which is obtained from the ICGR database, also measures the willingness of a country's citizens to accept established disciplines imposed by law and order-establishing institutions of that country (Knack and Keefer, 1995). Higher index values correspond to stronger courts, more thorough political institutions, and smoother mechanisms for the transitions of political power (Knack and Keefer, 1995).

Corruption: This variable, which is obtained from the ICRG database, is a 6 points index with 0 and 6 showing very high and very low corruption risk, respectively. High corruption adversely affects foreign investment, the economy and financial markets in a country. In countries with high corruption indexes, the government performs inefficiently since the assumption, transition, and wielding of power is not based on merit or sound policies.

Bureaucracy quality: This index from the ICRG database is a determinant of the political rights index. The belief is that stronger and more independent bureaucracies reduce the tendencies of new governments to change laws and regulations (Knack and Keefer, 1995; Bae and Goyal, 2009).

Efficiency of debt enforcement: This index is a critical determinant in financial, and particularly debt markets. Djankov et al. (2007) build this index using information about time, cost, and the transfer of assets in the cases of bankruptcy or liquidation. They show that this index is closely related to the legal origins of each country and is a strong predictor of the development of the debt markets.

Contract viability: This index from the ICRG database captures the risk that any contract can be unilaterally canceled or modified by the state or related authorities. It is of concern to foreign investors, particularly when the index level is low. Lower index values indicate more risk of asset expropriation for both domestic and foreign investors. Expropriation risk is shown to be important by Acemoglu and Johnson (2005) and Knack and Keefer (1995). Contrary to these studies that use this index cross-sectional (the former uses an index average between 1985 and 1995), we use this index in both their time-series and cross-sectional dimensions.

Contract enforcement costs and time: These two measures are obtained from the World Bank Doing Business database. They measure how efficient the bankruptcy courts are in a country. Since courts are the main institutions for legal enforcement (Bae and Goyal, 2009), this index mainly indicates the effectiveness of the legal system. Less time and cost indicate better resolution of distress, clearer asset transfers in the case of default, and lower ex-post default costs to the creditors.

Depth of creditor information index: This index obtained from the World Bank's Doing Business database concerns the credit information in a country. It shows how the scope and accessibility of information about credit is influenced by rules and regulations. The collector and redistributor of credit information can be either a private or public bureau. The index varies from 0 (not reliable) to 8 (most reliable), and is the sum of the zeros or ones given to each of eight features of the credit registries. Such features include, for example, if data about individuals as well as firms can be distributed, if at least 2 years of such data are distributed, and if borrowers are allowed by law to access their information collected by the credit bureau.

Strength of legal rights index: This is an index between 0 and 12 from the World Bank database. This index measures how well a legal system protects both the lender and the borrower in a debt contract. Higher index levels are associated with smoother lending mechanisms.

Property rights: This index is obtained from Economic Freedom as compiled by the Heritage Foundation. Property rights are shown to influence growth, asset allocation and development of financial markets (Acemoglu and Johnson, 2005; Claessens and Laeven, 2003). Higher property rights lead to better enforcement of contracts (Bae and Goyal, 2009) and provide more motivation for innovation and investment. Countries with a higher property rights index are also shown to be more developed.

Information sharing: Another set of country-level variables that can influence the creditor-borrower relationship is the existence of information sharing institutions. According to Djankov et al. (2007), there are two key aspects of information sharing in every country; namely, the existence of public and of private registries. Public credit bureaus are government-operated institutions that are engaged in collecting credit-related information on certain borrowers and providing such information to present or prospective creditors. These institutions may include a country's central bank, whose mandate would center more on collecting information about banks and banking-related corporations (Qian and Strahan, 2007). Information sharing is a dummy variable that equals one if either public or private registries exist in a country and zero otherwise. Such institutions are becoming more prevalent across the globe. The number of countries with such private bureaus has increased from 55 in 2003 to 120 in 2014. The importance of these institutions is that they provide more information in a more customized manner, and cover more non-bank lenders (Djankov et al., 2007). The existence of such registries facilitates the availability and exchange of information throughout the financial system, particularly between lenders and borrowers. Related data for information-sharing institutions is obtained from the survey of Jappelli and Pagano (2002) of banking supervision, also included in the World Bank's Doing Business website.

Table 2.7 reports our results. We include the creditor rights index in every column and add the above-explained variables once in columns 1 through 10. This table also controls for firm, macro and legal

determinants as in our base regression model. Based on the results summarized in this table, we observe that the previously identified negative relationship between debt-type heterogeneity and creditor-rights is robust after controlling for each of these additional variables. We find that debt-type heterogeneity is higher with lower corruption, bureaucracy quality, property rights, contract viability, depth of the creditor information index and the strength of legal rights, and it is lower with lower law and order and efficiency.

[Please insert Table 2.7 about here]

2.4.4.2 Control for omitted macro level variables and culture

A second potential concern with our results is that the creditor rights index may be capturing the effect of a country's macroeconomic conditions. To this point, we have shown how variations in time and the cross-section of creditor-rights institutions are related to debt-structure heterogeneity. We now test the robustness of this relation controlling for the following four country-level variables: domestic credit to GDP, stock market traded value to GDP, and GDP growth and liquid assets (M3) to GDP.

As an indicator of the maturity of financial and debt markets in a country, domestic credit to GDP is a widely used measure of a country's level of financial development (Djankov, McLiesh, and Shleifer, 2007). The stock market traded value to GDP, which measures the activity or liquidity of stock markets, is also used as a measure of financial development (Rajan and Zingales, 2003). GDP growth provides a measure of how quickly a country's economy is growing. The liquid assets to GDP ratio measures the financial depth of an economy (Qian and Strahan, 2007).[8] The inclusion of these four variables may diminish the relation between creditor rights and debt-type heterogeneity based on the argument by Glaeser et al. (2004) that country-level factors, like financial development and depth of markets, are the consequences of a country's creditor rights institutions as well as its legal origins.

Another possible concern is that the debt-type structure may be influenced by country-wide number of different debt types. This being the case, the cross-country variations in debt-types used by firms may be simply the result of the number of available debt types provided by the country where the firm operates. We address this concern by controlling for the number of different debt types aggregated over each country.

The result from regressions including the above five additional country-level variables for the $Specialization_{it}$ index as the dependent variables is reported in column 1 of Table 2.8. The effect of the creditor rights index remains highly significant after including these additional controls. Since its level of

[8] It is computed as the sum of the central bank's currency and deposits (M0), electronic and physical currency (M1), plus savings, foreign currency, and purchase agreements (M2), divided by GDP in any given year.

significance is reduced marginally, this suggests that the indicators of the financial market's maturity and depth may capture some of the effects of stronger creditor rights institutions. We also observe that both measures of debt-type heterogeneity decrease with Domestic credit to GDP, and increase with Stocks traded to GDP and Liquid assets to GDP.

[Please insert Table 2.8 about here]

Studies have shown the importance of culture, generally proxied by religion, on the development of financial markets (Qian and Strahan, 2007). While Stulz and Williamson (2003) find that religion is correlated with creditor protection, Djankov, McLiesh, and Shleifer (2007) find that the effect of religion on financial markets can be largely captured by legal origins. La Porta et al. (1998) find that nearly all country-specific variables, including culture, correlate with legal origins. Thus, including religion in the estimated relationships may alleviate any biases caused by omitted variables.

We use dummy variables to aid in determining the robustness of our previous results to the most prevalent religion in a country (as in Qian and Strahan, 2007; Stulz and Williamson, 2003). The religions chosen to be captured by dummy variables are Atheism, Buddhism, Catholicism, Hinduism, Judaism, Islam, and Orthodoxy, which means that their coefficients are relative to the other religions not so chosen (i.e. Christianity, Protestantism, and followers of Indigenous rituals).

These regression results are summarized in column 2 of Table 2.9. The estimated relation between creditor rights is large and significant for $Heterogeneity_{it}$. Relative to the religions not included in the regressions, the measure of debt-type heterogeneity is significantly higher for Atheist and Buddhist countries. Debt-type heterogeneity is also significantly higher for Catholic countries. Overall, the robustness of the creditor rights relation with debt-type heterogeneity controlling for religion suggests that this relation is robust to the effect of culture as captured by religion.

2.4.5 Robustness Test: Instrumental Variable Analysis

To address any further concerns regarding the existence of endogeneity in our study of the effects of creditor rights on debt-type heterogeneity we conduct robustness tests using an instrumental variable analysis. As argued before, one possible source of endogeneity in our setting is omitted variable bias. In previous sections we have controlled for a number of possible unobserved variables including additional institutional and macroeconomic determinants. There may still remain unobservables that are specific to the relationship between creditor rights and corporate debt structures that are not captured by macroeconomic, legal, or firm-level controls.

A still possible yet less important source of endogeneity can be reverse causality. In this regard, the strength of creditor rights influences debt-type structure and at the same time corporate debt-type structures may impact the strength of creditor rights[9].

To further detail with endogeneity due to a possible omitted variable bias and reverse causality, we conduct an instrumental variable analysis. Our selected instrumental variables need to exogenously determine the strength of creditor rights and have no direct influence, but through their impact on creditor rights, on corporate debt-type structures.

We use two different variables as instruments for the strength of creditor rights. To choose our first instrumental variable, we follow the law and finance literature where the emphasis is on the role of historically different legal traditions on the development of today's financial markets (LLSV, 1999; Djankov, McLiesh, and Shleifer, 2007; and Beck, Demirguc-Kunt, and Levine, 2003). For that we use the exogenous nature of legal origins since in many emerging countries they were imposed by colonial powers (Acemoglu and Johnson, 2005; La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1999) and even in countries with no history of colonialism, these institutions can be effectively considered as pre-determined (Acharya et al. 2011). More importantly, the impact of legal origin on the debt structures of firms is not direct and is mainly through a country's institutional and legal framework. Hence, as our main instrumental variable we use legal origin (English, French, German and Nordic) where the Nordic dummy is dropped to avoid the dummy variable trap.

Our second instrumental variable is ethno-linguistic fractionalization (ELF) (Houston et al., 2010). The impact of ethnic fractionalization on the quality of institutions is widely documented in the literature, for example in the work of Mauro (1995). La Porta et al. (1999) argue that ethno-linguistic fractionalization matters for countrywide legal and political institutions even after controlling for the effect of legal origins. Importantly, the literature shows that higher fractionalization leads to countries adapting institutions that allow one powerful group to seize the power (Beck, Demirguc-Kunt, and Levine, 2003 and 2006), largely weakening the law and order. In such countries, creditors are less protected and we expect that for them, the creditor rights protections be weaker. On the other hand, fractionalization does not impact firms' debt structure directly and it mainly impacts formation of capital market through legal and institutional settings, making it an appropriate candidate instrument for the strength of creditor rights.

The traditional measure of ELF is constructed as the likelihood that two randomly selected individuals

[9] It is noteworthy that the possibility of a reverse causality problem in our setting is minimal since it is unlikely that corporate financing decisions influence a country's legal outcomes, particularly the strength of creditor rights which is highly persistent in nature (Djankov et al. 2007).

in a given country are from two different ethnic groups. The index is therefore calculated as a Herfindahl index (Mira, 1964). Although the data used to build this index is more than 50 years old, it is used by, for example, Easterly and Levine (1997) and Houston et al. (2010) along with other economic and financial studies. We note that aside from the out-datedness of the index, there is growing criticism concerning its validity. For example Alesina, Dewleeschauwer, Easterly, Kurlat and Wacziarg (2003) argue that this index is chiefly concerned with language differences and does not adequately reflect ethnic variations. For example, it classifies blacks and whites in the USA as belonging to the same group. Another difficulty with this measure is that classification of different ethnic classes is rather subjective as there such definitive categories are not available. Alesina et al. (2003) also contend that fractionalization can even form endogenously as a result of migration when using the fractionalization index of Atlas, Narodov and Mira (1964).

We use a more developed measure of ELF developed by Alesina et al., (2003). This index addresses the above limitations in a variety of ways. First, the index uses a broader definition for ethnic groups in each country. Second, this index is not limited to language differences but also takes into account religious and ethnic variations. Using more recent data, this index covers more countries compared to the traditional index. When the authors study the effect of this new index on the quality of governance and institutions, they find that fractionalization is at least as important as the legal origins. Particularly, while ethnic fractionalization may possibly dominate legal origins in terms of its effects on institutions, Alesina et al., (2003) assert that the index can well be interpreted as important as legal origins.

We report the results for a 2SLS specification using each of the above instruments separately in Table 2.9. As done previously, we also control for firm, macro and institutional indicators, using industry and year fixed effects. The first and second columns in Table 2.9 use the main heterogeneity index and the SP90 index, respectively, as the dependent variable. The F-statistics (>200) rule out the possibility of weak instruments. As expected, Column 1 shows that stronger creditor rights decrease debt-type heterogeneity. The second confirms this finding by showing that the SP90 index is positively associated with creditor rights. One standard deviation increase in the creditor rights index is associated with a 3% decline in the standard deviation of the heterogeneity index and a 1% improvement in SP90, both verifying more concentrated debt structures in response to stronger creditor rights. Overall, this result is consistent with the conclusion that the positive effect of creditor rights on debt-type structures is not likely to be influenced by an omitted variable endogeneity problem, as the effect stays highly significant using either of these instrumental instruments.

[Please insert Table 2.9 about here]

2.4.6 Robustness Test: Alternative Sample Composition and Estimation Methods

As shown earlier in Table 2.2, firms in the U.S. and Japan constitute a considerable portion of our sample with more than 21% and 12% of total observations, respectively. We test if this over-representation materially affects our previous estimates by using three samples that exclude U.S. firms, Japanese firms and both U.S. and Japanese firms in the first three columns of Table 2.10, respectively. Based on these results, we find that our previous results are robust to all exclusions, and that in fact the creditor rights coefficient increases in magnitude for these subsamples.

[Please insert Table 2.10 about here]

Next, we address the possible effects of cross-listed firms on our results since our initial sample includes cross-listed firms that are exposed to two or more different country settings, including political, economic and legal rules and regulations. This may partially muddle our results as managers and creditors may interpret a firm's legal settings as a mix across the countries in which it is traded. To determine the sensitivity of our previous results to their inclusion, we eliminate any firm in our original sample that is in the sample of cross-listed firms identified by Sarkissian and Schill (2014, 2009 and 2004).[10] In untabulated results, we obtain similar results when the main tests are redone using this new sub-sample.

Another possible concern may rise from the effect of a large number of firms with upper bound specialization indexes. Roughly 20% of our sample firms have the maximum specialization index of 1, meaning that their debt structures contain only a single debt type. We investigate whether our results are influenced by this issue, using a formal Tobit specification. The last column of Table 2.10 reports the results of this Tobit specification. Our results in this column are very similar to other three columns, and confirm that the impact of creditor rights on corporate debt-type heterogeneity is not under the influence of perfectly specializing firms.

2.5 CROSS-SECTIONAL HETEROGENEITY

In section 2.2, we developed the predictions that managers may choose a more concentrated debt structure to: (1) ex-ante reduce the default and bankruptcy risk associated with stronger creditor rights, and/or (2) increase the incentives for lenders to monitor to offset the lower benefits of monitoring for lenders and the higher costs for r managers associated with stronger creditor rights. In this section, we test the role of these two mechanisms by examining their effects of debt-type heterogeneity across countries

[10] Their sample consists of 3,589 cross-listed firms from 73 home and 33 host markets.

with different strengths of creditor rights where firms within each country are not expected to be equally affected by the strength of within-country creditor rights.

As we argued before, improvements in creditor rights can impact firms' choice of debt structure in two ways. First, since stronger creditor rights increase the costs of default for the manager, the manager may ex-ante reduce the default and bankruptcy risk by choosing a more concentrated debt structure. Second, as stronger creditor protection necessarily reduces the benefits of monitoring, and therefore the literature shows that it can lead to higher default rates. Since default becomes costlier for the manager with stronger creditor rights, he can increase the creditors' monitoring incentives by ex-ante choosing a more concentrated structure as his incentives for high risk projects is reduced as an outcome of strong creditor protection. Here, we test these mechanisms by studying the heterogeneous effects of creditor rights across countries with different strengths of creditor rights.

According to the first proposed mechanism, we may expect some cross-sectional variations in debt-type heterogeneities when creditor rights in a country are stronger if bankruptcy is not equally costly for all firms within that country. Particularly, we expect that firms with higher ex-ante costs of bankruptcy to specialize more with stronger creditor protection. According to the second mechanism, we expect to see higher debt-type structure concentration for firms that have higher ex-ante costs of monitoring in response to higher creditor rights. We now discuss the metrics that are used to measure bankruptcy costs and monitoring incentives.

2.5.1 Bankruptcy Costs

We use two different measures from the literature to identify firms that face higher bankruptcy costs; namely cash flow volatility and tangibility (Colla et al., 2013). Firms with higher cash flow volatility face higher expected costs of bankruptcy and firms with higher asset intangibility incur higher costs of bankruptcy (Titman and Wessels, 1988; and Rajan and Zingales, 1995).

To construct the measure of cash flow volatility, we follow Kryzanowski and Mohsni (2013) using a rolling window containing the past six years of data. In this method, a firm's cash flow volatility $(CF_{i,t})$ equals income before extraordinary items (Compustat item #18), less changes in the working capital less depreciation and amortization (Compustat item #14). Intangibility is defined as one minus the ratio of net Property, Plant, and Equipment (Compustat item #8) to the book value of assets (AT). Our main variables of interest here are the interactions between these two measures and the index of creditor rights. As higher cash flow volatility and asset intangibility lead to higher ex-ante bankruptcy costs, we expect that the interaction of either with the creditor rights index will have a negative impact on the heterogeneity of debt-type structure.

The first two columns of Table 2.11 report our results. Following our original setting, we control for the same set of firm, macro and institutional determinants with industry and year fixed effects. The first column studies how firms with higher *intangibility* choose the heterogeneity of their debt structures in countries with higher creditor rights. The negative and highly significant estimate of the interaction of creditor rights and the intangibility index reported in the first column of Table 2.11 supports our expectations that firms with more intangible assets when creditor rights are higher use more concentrated debt-type structures. The second column studies the effect of cash flow volatility. Similar to the first column, the interaction of cash flow volatility and creditor rights negatively and significantly influence the heterogeneity index. This further corroborates our predictions that higher bankruptcy costs associated with stronger creditor rights induce firms to select lower debt heterogeneities and thus invest in more concentrated debt structures.

[Please insert Table 2.11 about here]

2.5.2 Information Collection Costs and Incentives to Monitor

If our second hypothesis about the effect of monitoring incentives on debt structure is correct, we expect that firms with higher cost of monitoring that are located in countries with stronger creditor rights to select more concentrated debt structures. This is expected since more concentrated debt structures provide more monitoring incentive to creditors (Houston et al, 2010; Colla et al., 2013) and thus allow managers to lower default costs and raise funds at lower costs ex-ante when creditors have more power legally. A general approach in the literature to proxy monitoring and information collection costs is to use R&D expenses (Sufi, 2007; Colla et al., 2013). However, this choice is somewhat problematic. First, there is no one to one relationship between higher R&D expenses and higher monitoring costs since firms with similar R&D expenses can have different monitoring costs due to varying levels of transparency. Second, the R&D costs may be confounded by a variety of endogenous determinants such as firm size, age and industry affiliation. Third, since a large number of firms in the Compustat database have no R&D cost entries, excluding these firms significantly reduces the sample size and can lead to a selection bias.

Instead, we use a market-based measure of firm transparency introduced by Berger et al. (2006). Since this index relies on market data, it indicates if market participants perceive a firm as being transparent and opaque. The method this index is constructed avoids the influence of such confounding determinants as firm size, age, or industry affiliation. As the index uses minimal inputs from the Compustat database, the loss in sample size from the use of this measure is minimal. Furthermore, it can be argued that higher opaqueness (lower transparency) has a stronger logical and intuitive link to the costs of information collection and monitoring than R&D expenses.

The idea behind this measure is that when a firm's information quality is high, investors trust the

information provided by the firm. On the flip side, investors treat a firm as being an average firm in the industry if the quality of the firm's information is poor. Berger et al. (2006) show that an appropriate transparency measure can be built as the idiosyncratic volatility of stock returns from the market data, divided by volatility of earnings that are reported by a firm.[11] Where $\delta \in [0, 1]$ is a measure of transparency and its higher values indicate that a firm is more transparent.

Since δ is by construction between zero and one, we can interpret $1 - \delta$ as a measure of *opaqueness*. We expect that more opaque firms in countries with stronger creditor rights will use more concentrated debt structures, all else held equal, due to higher costs of monitoring and information collection.

The estimated coefficient for our main variable of interest in this test, the interaction of the opaqueness index and the creditor rights index, is reported in the third column of Table 2.11. This interactive variable has a negative and highly significant association with debt-type heterogeneity with the inclusion of our original set of controls. This result supports the idea that more concentrated debt structures in response to higher creditor rights are influenced by monitoring incentives. This is consistent with the literature of debt-type heterogeneity, and particularly with the arguments of Colla et al. (2013) and Esty and Megginson (2003) that more concentrated debt structures provide better monitoring incentives to creditors.

2.6 CONCLUSION

The importance of debt structure as an integral part capital structure decisions is gaining increasing attention in corporate finance studies. In this paper, we provide the first international study for the determinants of debt structure. Particularly, we explore the cross-country determinants of corporate debt structure by investigating the relationship between the strength of creditor rights and debt-type heterogeneity across 46 countries. We argue that stronger creditor rights can lead to more concentrated debt-type structures through two mechanisms: first, by making default costlier for equity holders and the managers; and second, by reducing monitoring incentives for creditors.

Consistent with our expectations, we find negative and significant relations between the strength of creditor-rights institutions and firm-level debt-type heterogeneities. We find empirical support for the expected effect of the two mechanisms by examining the association of stronger creditor rights with debt-type heterogeneity using cross-sections of firms with different bankruptcy costs and levels of opaqueness. From an econometric perspective, we address a long debate in cross-country corporate finance studies where time-variant and time-invariant determinants coexist in panel regression models. Using correlated

[11] The construction of this index according to Berger et al. (2006) as well as databases used is explained in Appendix 2.

random effect estimators we are able to obtain consistent and unbiased estimates of the association of creditor rights with debt-type structures while consistently estimating both time-varying and time-invariant controls.

We account for a variety of possible endogeneity concerns, including omitted variable bias as well as possible but much less concerning reverse causalities. We address possibly omitted macro-level and institutional determinants by controlling for a variety of related variables from the law and finance literature. Moreover, we incorporate instrumental variables to address any possible effects not already captured by firm-level, macroeconomic, political and institutional controls.

Chapter 3:

Corporate Credit Spreads and Policy Uncertainty

3.1 INTRODUCTION

Government policy makers set the rules of competition for the private sector, and their roles in financial markets have significantly increased in recent years. Policy makers can contribute to economic uncertainty when they fail to agree on prospective policy changes dealing with fiscal, monetary or regulatory issues. The market reaction to these changes depends on whether the policy outcome is predictable, and is higher with higher uncertainty. Interest in the effects of policy-related uncertainties on economic, corporate and market activities has increased over time in the academic literature, public debates and the various print media.[12] Since changes in fiscal, tax, regulatory and monetary policies directly influence the bond market, we empirically contribute to this line of research by studying the influence of policy uncertainty on corporate credit spreads. This paper aims to investigate whether and how policy uncertainty affects the credit spreads of US corporate bonds. This examination is important since some observers argue that the recent weak recovery in the U.S. after the financial crisis is to some extent due to uncertainty over fiscal policies and regulatory reforms.[13]

Policy uncertainty is not directly observable since its impact on financial markets is mostly through its impact on the perceptions of investors. Election dates are used as a common proxy to capture the period during which such uncertainty is elevated.[14] However, Pastor and Veronesi (2012, 2013) argue that

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[12] Bloom, Baker and Davis (2013) document a marked increase in the frequency of the word "uncertainty" related to policy since the recent global financial crisis. For example, using the FOMC's Beige Book, they show that the portion of political uncertainty as a part of overall policy uncertainty (PU) has increased significantly, especially after 2008.

[13] See, for example, the "Minutes of the Federal Open Market Committee," August 9, 2011, http://federalreserve.gov/monetarypolicy/fomcminutes20110809.htm; Becker, G. S., S. J. Davis, and K. M. Murphy. (2010). Uncertainty and the slow recovery. *Wall Street Journal* , sec. Opinion.

[14] For instance prior studies examine how national elections across countries impact stock return volatility (Boutchkova, Doshi, Durnev, and Molchanov, 2012); how political uncertainty in election years change corporate investment sensitivity to stock prices (Durnev, 2010); and how uncertainty about gubernatorial elections affect the yields on municipal bonds (Gao and Qi, 2013). Other studies include Leah and Whited (1995), Minton and Schrand (1999), Ghosal and Loungani (2000), Bond and Cummins (2004), Bloom, Floetotto, Jaimovich, Saporta-Eksten, and Terry (2012), and Stein and Stone (2012).

"political uncertainty" should be distinguished from "policy uncertainty".[15] A shortcoming with the use of election dates is their low frequency, which means that they fail to effectively account for variations in policy uncertainty between election dates. As an alternative, Baker, Bloom and Davis (2015) propose an alternative index for policy uncertainty (PUI). The important feature of this index is that it incorporates a measure of investor sentiment into the index. By counting the number of "uncertainty" and related word references such as "policy", "legislation" and "regulation" in the most-read US and global newspapers such as the Wall Street Journal, this index introduces a daily component of policy uncertainty. Baker, Bloom and Davis (2015) find that tax, spending, monetary and regulatory policies have the highest number of policy-uncertainty references and therefore their overall PUI index includes monetary, fiscal and regulatory uncertainties.[16]

We use this PUI index as our main indicator of policy uncertainty throughout the paper. There are various reasons for the choice of this index. Primarily, we argue that this index is an appropriate measure of economic policy uncertainties. Validation tests are performed in the original work of Baker, Bloom and Davis (2015, BBD hereafter) to ascertain the suitability of the index. For example, BBD replace the word "uncertainty" with the term "equity price" and show that the new index correlates with the VXO index as high as 70%. Moreover, they incorporate human expert analysis and confirm their content analysis methodology, as the software results were different only in less than 2% of the cases with those of the human experts. BBD also validate that their results are not influenced by the choice of selected magazines, by changing the primary source of data and obtaining a very similar index to the original. Not surprisingly, this index is being widely used recently in a variety of policy uncertainty studies including Pastor and Veronesi (2013, JFE), Gulen and Ion (2015, RFS) and Francis et al. (2014).

We use monthly corporate bond transaction data from Trade Reporting and Compliance Engine (TRACE) from the 2002 to 2012 period and bond characteristics from the Fixed Income Securities Database (FISD) database. We find that the level of policy uncertainty significantly affects corporate credit spreads after the inclusion of various firm, bond and macro level controls. We find that a one standard deviation increase in policy uncertainty results in 25 basis points (bps) increase in the credit spreads of corporate bonds. Comparing the impact of policy uncertainty on a cross-section of investment and speculative grade bonds, we show that investment grade bonds are more affected by changes in policy uncertainty. One

[15] Pastor and Veronesi (2012, 2013) refer to policy uncertainty as "impact uncertainty", which corresponds to uncertainty about the impact that a new government policy would have on the profitability of the private sector.

[16] The PUI index weights are 0.5 for the broad news-based component and the same 1/6 for the components that reflect: (a) uncertainty about the tax-code expiration by the Congressional Budget Office, (b) CPI forecast disagreement, and (c) federal/state/local purchases disagreement. The PUI has the ability to effectively capture changes in policy uncertainty between election years such as the debate over the debt ceiling, Gulf war, FED's tapering of QE3, financial crashes and the most recent US government shut down.

standard deviation increase in PUI increases the investment-grade (speculative-grade) credit spreads by 24.76 (5.43) bps. Consistent with the theoretical predictions in Pastor and Veronesi (2012), we find that the effect of policy uncertainty on credit spreads is much larger during recessions than expansions. We also find that all four PUI components have large and significant effects on credit spreads.

To infer the causal impact of policy uncertainty on corporate credit spreads, we address a variety of endogeneity concerns. Primarily, we address the influence of omitted variables on our results. Since policy uncertainty surges mostly during bad economic conditions and so do corporate credit spreads, we account for such possible effects by controlling for indicators of overall economic conditions. Other possible omitted variables are the general indicators of economic uncertainty, since economic uncertainty determinants may simultaneously impact policy uncertainty and credit spreads. We address this possible effect by controlling for election periods as well as the CBOE's VXO index and a firm's idiosyncratic volatility. Our results are robust to the inclusions of both of the omitted variables above.

Another possible source of endogeneity in our tests is that the policy uncertainty index may well capture other economic uncertainties that are unrelated to uncertainties about governmental policies. To address such possible contamination problem, we note that there is a large impact of US economic status on that of Canada, while policy uncertainties across the two countries only partially affect the others. We exploit this opportunity by regressing the US policy uncertainty index on the Canadian policy uncertainty index and use the regression residuals as the alternative policy uncertainty index. Finally, to rule out further concerns about endogeneity we use an instrumental variable analysis. We include three instruments for US policy uncertainty including the relative power of the two main US political parties, the level of political polarization in the country and finally, the interaction of these two indexes. We conclude that our results are not influenced by the above possible endogeneity problems since all of the above alternative investigations confirm our primary results on the positive impact of policy uncertainty on credit spreads.

We investigate possible mechanisms through which policy uncertainty affects corporate credit spreads. To do so, we explore the differential effects of increased policy uncertainty on corporate credit spreads across different cross-sections of firms. Our test is thus constructed based on the idea that not all firms are similarly affected by changes in policy uncertainty. According to the related literature, there are two particular channels that can create heterogeneous corporate decision responses in face of increased policy uncertainty. These two channels are (a) investment irreversibility (Bernanke, 1983; Rordik 1991) and (b) dependence on government spending (Gulen and Ion, 2015). These two variables increase default probabilities for the cross section of firms during the periods of elevated policy uncertainty. The former channel argues that firms postpone positive NPV projects in response to increased policy uncertainty particularly when their investments are highly irreversible. Firms with more irreversible projects are more willing to postpone their profitable investment options in response to high policy uncertainty. This

adversely affects a firm's cash flows, increasing its risk of debt repayments and default probabilities and results in higher credit spreads.

The second mechanism contends that high policy uncertainty creates cross sectional responses across firms with different levels of dependence to government spending. The reason is that the cash flow of firms with more dependence on government purchases and projects becomes more volatile as government policies become more uncertain. This in turn can raise default probabilities.

An important question in this study is how different components of credit spreads are affected by changes in policy uncertainty. Thus, we investigate the reaction of two of the components of credit spreads, i.e. default spreads and bond-CDS basis to changes in policy uncertainty. The former measures the probability of default, while the latter roughly measures the systematic market risk premium. Using firm-level CDS data from Markit database, we investigate the response of CDS-spreads as well as Bond-CDS basis to changes in policy uncertainty and document that increases in policy uncertainty have positive and significant impacts on both of these components. Our result that increased policy uncertainty increases default probabilities confirms our proposed mechanism that policy uncertainty affects credit spreads through increases in the inability of firms to repay their debt obligations, i.e., through an increase in default probabilities. Moreover, our results on bond-CDS basis are consistent with the findings of Pástor and Veronesi (2013) that the market requires an extra risk premium in periods of high policy uncertainty. Finally, to test the appropriateness of the PUI index, we compare its effect on credit spreads with that of a list of other proxies of policy uncertainty from the related literature, including monetary, fiscal and government policy uncertainties and show that the effect of PUI is robust to any such controls.

Our paper makes three important contributions to the existing literature. First, we add to the literature of the determinants of credit spreads (Campbell and Taksler, 2003; Ericsson, et al., 2009; Collin-Dufresne *et al.*, 2001; Elkamhi et al., 2012; Avramov et al., 2007; Chen et al., 2007) by showing that policy uncertainty has a large influence on corporate credit spreads. Second, this paper contributes to the literature dealing with the effects of the political economy and "institutional uncertainty" on financial markets (Qi, Roth and Wald, 2010; Roe, 2006; Roe and Siegel, 2011; Keefer, 2008; Acemoglu, Johnson, Robinson, and Thaicharoen, 2003) by studying the effects of policy uncertainty on debt markets of a "developed economy". The reason is that, of the four categories[17] of "institutional uncertainty" considered in this literature (Brunetti and Weder, 1998), only policy uncertainty changes in "developed economies" with mature institutional frameworks. Third, we contribute to the literature on the impacts of policy and political uncertainty on corporate investment and financing decisions (Gulen and Ion, 2015; Julio and Yook, 2011; and Julio and Yook, 2012; Durnev, 2010; Francis et al., 2014; Gao and Qi, 2012; Bradley et

[17] The four categories are policy uncertainty, government instability, political violence and enforcement uncertainty.

al., 2014; Cao et al., 2013) by providing insights on how corporate credit spreads and cost of capital react to elevated policy uncertainty.

The remainder of the paper proceeds as follows. Section 3.2 discusses the sample and data preparation. Section 3.3 reports and interprets some initial empirical findings, and particularly the average effect of policy uncertainty on credit spreads. Section 3.4 deals with endogeneity concerns and Section 3.5 provides evidence for possible mechanisms through which policy uncertainty creates cross sectional heterogeneity. Section 3.6 studies the influence of policy uncertainty on different components of credit spreads. Section 3.7 investigates the robustness of our results to inclusion of other possible measures of policy uncertainty. Some concluding remarks are presented in Section 3.8.

3.2 SAMPLE, DATA AND SUMMARY STATISTICS

3.2.1 Sample and Data

Our primary source for bond data is the Transaction Reporting and Compliance Engine (TRACE) database. This database is provided based on a bond-related regulatory requirement that targets more transparency in the secondary bond markets. TRACE provides bond transaction data on a daily basis, and includes features such as transaction price, yield to maturity, and bond maturity date. We focus only on completed trades between 2002 and 2012, and therefore exclude trades marked as cancelled, corrected or suspended from the sample similar to Edwards, Harris and Piwowar (2007). If bonds are traded more than once in a day, we compute daily bond yields and prices as averages of transactions completed in the same day. The data frequency in this paper is monthly, so our monthly measures of bond yields and prices are averages over each month of daily yields and bond prices.

To include bond characteristics we merge the TRACE database with the Fixed Income Securities Database (FISD) using the 9-digit issuance (CUSIP) codes that are common to both databases. This adds Moody's ratings and a variety of bond characteristics to our sample, such as coupons, maturities, issuance amount (size) and times of issuance. Next, we merge this database with the Compustat North America database with quarterly frequencies. We retain all non-financial firms (i.e., those with SIC codes that are not between 6000 and 6999) in this merged TRACE-FISD sample that have accounting information in COMPUSTAT. We remove bonds with maturities of less than one year, and trim the top and bottom 1% of credit spreads to deal with possible outliers. Credit spreads are obtained by subtracting the yield of the closest maturity T-Bill rate from the yield of each bond, where the former is obtained from the Federal Reserve Board website.

3.2.2 The Policy Uncertainty Index

The PUI index of Baker, Bloom and Davis (2015) is created mainly using news searches. The authors perform a series of tests and validity checks to show that this index appropriately proxies economic policy uncertainties. In the first set of examinations, they change the search term "uncertainty" to "equity price", "stock market" or "stock price" in their original search and show that the index created using this method has more than a 70% correlation with the VXO index, which is a measure of implied forward-looking volatilities across S&P 500 firms. Second, the authors perform human audits of newspaper articles used to construct the index. The authors thus find that only in 1.8% of cases that the human inference of the direction of policy uncertainty change is different from that of the mechanically constructed index. Third, the authors examine the validity of the choice of newspapers as the main source of information. Particularly, they test whether the reflection of policy-related news in newspapers is influenced by the political positions of newspapers at the times when the ruling party has different political ideologies with that of the newspaper, and find no evidence for this hypothesis (Gulen and Ion, 2015). Finally, authors change their primary data sources and re-create the index as a test of robustness. For example, using the Fed's Beige Books[18] as the alternative source of information, Baker, Bloom and Davis (2015) find that the new index has as high as a 80% correlation with the original index. In this paper, we also test this index in a variety of ways. Such tests include comparing the index with other monetary, fiscal or government policy uncertainty proxies introduced in the literature. Overall, our results suggest that the PUI index is a robust and appropriate indicator of economic policy uncertainties.

3.2.3 Summary Statistics

Table 3.1 reports summary statistics for this study's main variables. In this table, Panel A reports the summary statistics in three sections. The first section reports firm-specific variables for the sample not differentiated by credit-rating status (All), while the second and third sections summarize Investment Grade and Speculative Grade samples, respectively. As expected, speculative-grade bonds have higher credit spreads and coupons, shorter maturities, lower liquidities, and exhibit smaller term spreads. Panel B of Table 3.1 reports the summary statistics for the macro-variables and other proxies for policy uncertainty that are not firm dependent. It is not surprising to observe considerable variations in the S&P

[18] The "Beige Books" are published by the Federal Reserve. Each District Fed collects "anecdotal" evidence on the state of the economy through a report. These reports are essentially generated using interviews with bank and branch directors, other economists and experts. Then all this information is summarized by District in the Beige Book. These books are published eight times per year.

return over the study period and material variability in all the variables associated with the PUI index or its components.

[Please place Table 3.1 about here.]

Panel C of Table 3.1 reports summary statistics for the level of Treasury bill yields, credit spreads, and maturity-matched credit spreads in low and high policy stability regimes based on whether that period's PUI is respectively below or above the median PUI over our study period. This panel shows that the corporate total yield, maturity-matched credit spread (total yield less the closest maturity T-Bill yield) and yield-spread with no maturity match (total yield less the 3-month treasury bill yield) and the three month treasury rates are higher in high PUI regimes, suggesting a positive relation between policy uncertainty and credit spreads. Table 3.2 reports the correlation matrix between the variables used in this study.

[Please place Table 3.2 about here.]

3.3 EMPIRICAL RESULTS

In this section, we empirically investigate the effects of economic policy uncertainty on corporate credit spreads. Primarily, we present regression results to estimate the magnitude and direction of the effect. We further study effects of policy uncertainty across different rating classes of investment and speculative grade bonds. Moreover, we investigate the influence of each of the policy uncertainty components on credit spreads.

Our control variables include firm-level, bond-level and macroeconomic level determinants. These control variables are selected from the literature on the determinants of corporate credit spreads including Pogue and Soldofsky (1969), Pinches and Mingo (1973), Leland (1998), Blume et al. (1998), Campbell (2003), Collin-Dufresne, Goldstein, and Martin (2001), Campbell and Taksler (2003), Chen, Lesmond, and Wei (2007) and Ericsson, Jacobs and Oveido (2009).

Firm-level controls include operating income to sales, market leverage, pre-tax interest coverage dummies and total debt. These control variables are used widely in the literature of credit spreads determinants. High pre-tax interest coverage and operating income to sales indicate that the firm has better financial health and thus may have lower credit spreads. Higher market leverage and total debt imply highly levered firms and thus may result in higher credit spreads. Since the highest frequency for accounting data for variables such as market leverage is quarterly, we obtain a monthly market leverage ratio by dividing total debt (short- plus long-term debt) by average firm value where the equity portion is updated daily (as in Ericsson, Jacobs, and Oviedo, 2009).

Instead of using the interest coverage continuously, we use four interest coverage dummies in our regressions. The reason, as argued by Campbell and Taksler (2003) and Blume et al., (1998) is that changes in the interest coverage variable have essentially non-linear effects on credit spreads. For example, increase in the interest coverage from 4 (BBB- rated bonds) to 6 (A- rated bonds) can result in a bond upgrade, while a similar change from 20 to 22 has almost no effect on a bond's rating. Low pre-tax coverage values can therefore be much more informative about the issuer's risk. The interest coverage dummies are constructed corresponding to values less than 5, between 5 and 10, between 10 and 20 and finally greater than 20.

We also control for firm idiosyncratic volatility, measured as the standard deviation of daily excess returns relative to the CRSP value-weighted index over the 180 days prior, but not including, the bond transaction date. As Campbell and Taksler (2003) show, the standard deviation of daily excess returns has a positive impact on credit spreads.

We use three main macro-level controls including the closest benchmark Treasury rate, the term slope and S&P 500 index returns. The term slope is computed as the difference between 10 year and 2 year maturity Treasury rates. We expect a negative relationship between the level of treasury rates and credit spreads, as discussed by Longstaff and Schwartz (1995), since higher interest rates raise the risk-neutral drift of the firm value and thus reduce the risk-neutral default probabilities. This should be naturally translated into lower credit spreads. We expect that term slopes have mixed impacts on credit spreads, since as Collin-Dufresne et al. (2001) argue the slope of the term structure can be a measure of economic uncertainty (positive impact) as well as an expectation for future short rates (negative impact).

We include S&P 500 returns as another macro-level variable predominantly to account for general market conditions. We expect a negative relationship between S&P 500 index returns and bond yields since higher S&P 500 index returns indicate better economic conditions and thus better corporate growth. This can in turn push the corporate credit spreads down.

We also need to control for bond liquidity. There are a variety of methods in the literature for estimating bond liquidity. For example, Campbell and Taksler (2003) use bond size (issue amount) to proxy for liquidity as the bond issue size has a high correlation with firm value. An important limitation of this approach is that not all bonds of the same firm have the same level of liquidity, a fact that calls for a more direct liquidity measure. Bond age is another proxy used for bond liquidity (Beim, 1992), however there is no straightforward relation between a bond's age and its liquidity. Guntay and Hackbarth (2010) use the number of months a bond is traded prior to the bond's transaction date. Although this measure is clearly more direct and tangible than the former measures, it has an important limitation. In this case, a

bond that is traded in every day of a month will have the same liquidity as a bond which has been traded only once in that month, as noted by Kim and Stock (2011).

To address all of the above limitations, we use the number of transactions per month as our measure for bond liquidity. This is a more direct measure than the first two liquidity proxies and at the same time does not suffer from the limitation in the third proxy. Constructing this liquidity index is possible in our study since we have the daily transaction data from the TRACE database.

We also need to control for credit ratings since credit ratings directly affect credit spreads. Ederington, Yawitz, and Roberts (1987) and others find that credit ratings help explain cross-sectional differences in credit spreads after controlling for firm and issue characteristics, and there is a clear positive relationship between the deterioration in a bond's rating quality and surge in its credit spreads. We use Moody's bond rating reports from the FISD database. We convert alphabetical ratings to numerical equivalents similar to Lerner, Sorensen, and Stromberg (2011). To do so, we assign numerical equivalents to the bond ratings so that each notch difference in alphabetical ratings translates into one unit change in the numerical measure. With this method for example, Aaa equals 1, Aa1 equals 2 and C equals 21. As higher numbers indicate lower credit ratings, we expect a positive relationship between this numerical equivalent and credit spreads.

We include coupon rates since as Elton et al. (2000) and Campbell and Taksler (2003) argue, bonds with higher coupon rates are taxed higher during their life. This leads to less desirability of these bonds compared to bonds with lower coupon rates. We also control for other general bond characteristics including issue size and maturity and the putability feature. Bond maturity impacts the yield depending on the term spread. The issue amount may impact the bond liquidity and thus influence the yield. Finally, putable bonds are thought of as less risky investments as the holder has the option to sell the bond back to the issuer before the bond matures, and thus may reduce credit spreads.

We take into consideration the election periods by including an election dummy, as the traditional indicator of policy uncertainty in the literature. This binary variable equals 1 for each presidential election year, and is zero otherwise.

Table 3.3 summarizes the expected influence of the above credit-spread determinants as documented by three seminal papers in the related literature including Collin- Dufresne et al. (2001), Campbell and Taksler (2003) and Ericsson *et al.* (2009) in columns one to three, respectively. Detailed descriptions of the above variables are provided in Appendix 3.

[Please place Table 3.3 about here.]

3.3.1 Impact of Policy Uncertainty on Corporate Credit Spreads

We begin our empirical investigations by estimating the average impact of policy uncertainty on credit spreads. Equation 3.1 shows our primary regression setting. In our regression analysis, we are mainly interested in capturing the effect of the PUI index as the independent variable. As discussed above, we control for a set of firm-level, bond-level and macroeconomic determinants throughout all our specifications.

In regression models throughout this study we include monthly dummies and account for firm-level clustering across the panel. To account for spurious regression results, we use lagged PUI measures to deal with changes in other macro variables that simultaneously may affect credit spreads and policy uncertainty. To further mitigate the possible unobserved effects of firm-level determinants that are not captured in related controls, and to address further concerns about persistence in firm-level determinants (Lemmon, Roberts and Zender, 2008), our default specification incorporates firm fixed effect models. Our base regression can be expressed as

$$CREDSPREAD_{i,t} = \beta_0 + \beta_1 PUI_{i,t-1} + \beta_2 FIRMCTRL_{i,t} + \beta_3 BONDCTRL_t + \beta_4 MACROCTRL_t + \eta_i + \epsilon_{i,t} \quad (3.1)$$

In the above model $\mathrm{PUI_{i,t-1}}$ is the lagged policy uncertainty index, $\mathrm{FIRMCTRL_{i,t}}$ is the matrix of firm-level controls including operating income to sales, market leverage, pre-tax interest coverage dummy and total debt. $\mathrm{BONDCTRL_{i,t}}$ is the matrix of bond-level characteristics and includes Moody's credit rating, coupon, maturity, bond liquidity, putability feature and issuance amount. Finally $MACROCTRL_t$ includes macroeconomic variables including term slope, S&P 500 index return, and the maturity-matched T-Bill rate. η_i captures the firm fixed effect and $\epsilon_{i,t}$ is the regression error. Since the confidence intervals become smaller with larger sample sizes, there is a possibility that we reject the null hypothesis when sample size is large (Leamer, 1978, Ch. 4; Shanken, 1987; Connolly, 1989). To address this issue, we report significance levels at 10%, 5%, 1% and 0.1% levels. To account for a possible heteroskedasticity effect, we report results based on heteroskedasticity consistent standard errors.

The above regression results are reported in Table 3.4. Our results are estimated using standardized variables to more clearly show how much credit spreads change in basis points in response to a one standard deviation change in each of the explanatory variables. Column 1 reports the univariate regression results, using the policy uncertainty index of Baker, Bloom and Davis (2015) as the main explanatory variable. This univariate test provides primary evidence on the magnitude and direction of the effect of

interest. This column shows that one standard deviation increase in the policy uncertainty index is associated with 43.04 bps increase in corporate credit spreads. The adjusted R-squared is also interestingly as large as 10%. In the second and third columns, we remove the policy uncertainty index and include macroeconomic as well as bond-specific determinants to explain credit spreads. Considering all these determinants concurrently produces almost the same goodness of fit as does the policy uncertainty index in the univariate regression of Column 1. In Column 3, we include the election dummy as the traditional indicator of policy uncertainty. The estimated coefficient for the election dummy is, as expected, positive and highly significant. The election dummy estimate indicates that during and up to three months to major US elections, corporate credit spreads increase as much as 28 basis points. However, inclusion of this variable improves the model's goodness of fit only marginally, as the adjusted R-squared increases merely from 10% to 11%. In Column 4 we add the PUI index to the model and observe that the adjusted R-squared improves to 15% while the large and significant effect of the PUI is preserved. Columns 7 through 10 report regression results using additional control variables including firm-level determinants. Column 10 shows that even after including all firm level, bond-level and macro-level determinants, policy uncertainty still has a large, positive and significant influence on credit spreads. The goodness of fit also improves moving from Column 9 to Column 10, as the adjusted R-squared increases from 27% to 29% when we include the PUI index while controlling for all of the above credit spread determinants.

Throughout this table we confirm the predictions in the literature for the direction of effects of firm, bond and macro level determinants on credit spreads. As expected by the argument of Longstaff and Schwartz (1995), the closest Treasury benchmark has a negative influence on credit spreads, while term slope positively impacts credit spreads (Longstaff and Schwartz, 1995). Longer maturities and higher coupon rates both increase credit spreads. The issuance amount and dummy putable both have negative impacts on credit spreads. The effect of the issuance amount is arguably due to higher liquidity associated with larger issuances (Campbell and Taksler, 2003). The putability feature, as we discussed before, sreduces credit spreads but the effect is either not significant or is only marginally so.

Deterioration in bond credit rating increases credit spreads. This confirms the expectation that lower rated bonds intuitively have higher credit spreads. The table also shows that more liquid bonds have lower spreads. A one standard deviation improvement in bond liquidity is associated with almost a 5% reduction in credit spreads. Higher S&P returns, as expected, reduce credit spreads while higher market leverage is associated with higher credit spreads. Debt capitalization reduces spreads. This effect can be primarily due to the fact that larger firms have more debt. The Pre-Tax coverage dummies (Blume et al.,

1998) all reduce credit spreads. While we have four pre-tax coverage dummies, the fourth dummy is dropped due to collinearity.

[Please place table 3.4 about here.]

3.3.2 Policy Uncertainty and the Credit Spreads Across Investment and Speculative Credit Ratings

We now run separate regressions for investment and speculative grade bonds to further investigate whether policy uncertainty impacts different rating classes differently. Results are reported in Table 3.5. Columns 1 to 4 report results for the investment grade sample and columns 5 through 8 repeat the same study for a sample of speculative grade bonds. The investment grade sample includes bonds with Moody's credit classes of Baa3 and higher, where the speculative grade sample includes ratings of Ba1 and lower.

Results show that the effect of policy uncertainty on credit ratings is higher across the investment grade sample. After controlling for firm, bond and macro level determinants of credit spreads, we observe that a one standard deviation increase in policy uncertainty is associated with a 24.76 bps increase in investment grade credit spreads while the same increase in policy uncertainty only leads to a 5.43 bps rise for the speculative grade sample. The effects of other determinants are largely similar across the two samples, and confirm our findings in Table 3.4. However, the election dummy remains only largely significant in the investment grade sample. This result indicates that investment grade firms are impacted much larger by changes in policy uncertainty than the speculative grade sample.

[Please place Table 3.5 about here.]

The reason for this, we argue, can be due to the fact that a much larger portion of speculative grade credit spreads is composed of the firm-specific default probability. For example using a wide range of structural models, Huang and Huang (2012) conclude that credit risk constitutes merely a small fraction of investment grade bond's credit spreads, whereas it accounts for a much larger portion of high-yield bonds' credit spreads. This can in turn lead to larger effects from market-wide, systematic factors such as policy uncertainty on investment grade bonds as documented in Table 3.5. We further study the systemic impact of policy uncertainty on credit spreads in section 3.6.

3.3.3 Relative Importance of the Four Components of the PUI

In this section we examine the impact of each of the four components of the PUI of Baker *et al.* (2012) on credit spreads based on fixed-effects panel regressions. We are primarily interested to investigate how each of the policy uncertainty index components affects credit spreads. The four components of this index are (1) the news-based component, (2) federal, state, and local government purchases disagreement, (3) CPI forecast disagreement across professional forecasters and (4) Uncertainty about tax code expiration.

Similar to our former regression models, we use fixed effect specifications controlling for firm clustering and also include 11 monthly dummies. We run four independent regression models similar to the base regression (Equation 3.1) while in each of these models only one of these components is used as the main explanatory variable. Based on the results reported in Table 3.6, the coefficient estimates are highly significant for all four PUI components, and all have a positive impact on credit spreads except for the tax expiration uncertainty component [column (4)].

This table shows that the news-based component and the CPI forecast disagreement have the largest positive impacts on credit spreads. One standard deviation increase in each of these components is associated with roughly a 27 bps increase in credit spreads. The purchase disagreement among federal, state and local governments has the smallest impact where a standard deviation in this component increases credit spreads only as much as 6.14 bps.

[Please place Table 3.6 about here.]

3.4 ADDRESSING ENDOGENEITY

So far, we have established a large and positive association between policy uncertainty and credit spreads. In this section, we study the causal relation between these two variables, and specifically address whether changes in economic policy uncertainties cause changes in corporate credit spreads. To infer causality, we need to sufficiently alleviate any possible endogeneity concerns.

The endogeneity problems here may stem from three sources. First, there may be omitted variables, particularly unobserved economic uncertainty determinants or effects from business cycles, that affect the PUI and credit spreads simultaneously, and thus our original regressions may be capturing the effects of these omitted variables. Second, we need to make sure that the effect of PUI on credit spreads that we capture in our studies is not from economic uncertainties that are unrelated to the PUI. This will result in a measurement error bias in our findings. Finally, there may be a simultaneity problem in the form of a reinforcing loop between PUI and credit spreads. Specifically, an increase in policy uncertainty might push the spreads higher and at the same time higher spreads may be interpreted by market analysts as

indicators of higher policy uncertainty and therefore be reflected in the news. Thus, simultaneity is an eminent concern as the main component of this index is news-based and is constructed by counting related words in newspapers and journals. This section presents several approaches to mitigate the above possible endogeneity problems.

3.4.1 Omitted Variables

3.4.1.1 Business Cycles

It is well documented that credit spreads are counter-cyclical (Gulen and Ion, 2015; Bloom, 2014; Baker, Bloom and Davis, 2015). At the same time, policy uncertainty may also escalate during economic downturns. Bad economic times induce more incentives among policy makers and politicians to propose or seek policy changes, and therefore can lead to higher policy uncertainty. To corroborate this idea, Bloom (2014) shows that the PUI index of Baker, Bloom and Davis (2012) is 51% higher during recessions[19]. Moreover, Pastor and Veronesi (2012) conjecture that "*Policy uncertainty is more likely to occur when the economy is in the downturn and as compensation investors demand higher risk premiums.*" The simultaneous rise in corporate credit spreads and policy uncertainties during economic downturns imposes a certain challenge on causal interpretation of our results, as our regressions may in essence be capturing the effects of different economic conditions and particularly business cycles.

While the use of lagged values can reduce such concerns to some extent, our results could still be influenced by the effect of such an omitted variable, i.e. business cycles, that persist over multiple periods. In this section, we incorporate two approaches to mitigate these concerns.

First, we examine whether the impact of policy uncertainty on credit spreads varies with economic conditions. We use the NBER measure of recessions as an indicator of economic downturns. Based on this data, we split the sample into recession and expansion samples and repeat the estimation of our base regression for each of these samples separately. Table 3.7 reports the results. Columns 1 and 2 report the regression results using a univariate regression with the PUI index as the main explanatory variable. Columns 3 and 4 report the full regression results using additional controls. In these four columns, the odd (even) columns use the recession (expansion) samples. Based on the univariate regression results, the

[19] In fact, increases in uncertainty during recessions is not limited to policy uncertainties. Bloom (2014) shows that all different measures of uncertainty surge during recessions. The same study shows that even at a micro level and considering individual firms, plants and industries, that the micro uncertainty increases at every level during recessions. Moreover, Campbell, Lettau, Malkiel, and Xu (2001) document that stock return variations across individual firms increase more than 50% in recessions compared to booms.

effect of policy uncertainty on credit spreads is positive and significant under both economic conditions. This effect, however, varies in magnitude across the two samples. As the table shows, a one standard deviation increase in policy uncertainty is associated with as much as a 91 bps increase in credit spreads during recessions. The same magnitude of change in expansions has a much lower impact on credit spreads and is associated with roughly a 23 bps rise in credit spreads. The model's goodness of fit shows similar differences, where it is as large as 52% in recessions and only 10% during expansions. Our results are robust after controlling for firm, bond and macro level determinants of credit spread. Across columns 3 and 4, we confirm our former finding that the influence of policy uncertainty on credit spreads is positive and significant across both expansionary and recessionary periods, while the impact is much larger during the expansions.

[Please place Table 3.7 about here.]

Next, we include several macroeconomic variables to capture fluctuations in macro-level market and economic conditions. We include the expected GDP, expected unemployment and expected one-year inflation from the Survey of the Philadelphia Federal Reserve Livingstone Survey. This survey is conducted since 1968 by the American Statistical Association and the National Bureau of Economic Research and aggregates professional forecaster's predictions on key economic variables. We also use the Michigan Consumer Confidence Index from the University of Michigan[20] as another measure of general economic conditions.

As reported in Table 3.8, we include each of these variables separately in columns (1) to (4) and in (6) to (9), and together in columns (5) and (10). When we examine the first five columns that report results for regressions that do not include the PUI, we observe that all four alternative macro variables as controls are highly significant in all five regressions. Next, we include the PUI index in specifications in columns 5 through 10. These columns show that the effect of the PUI index stays large and significant after all four macroeconomic controls are included. In Column 10, we further address the potential concern of high correlations between these four macroeconomic control variables and the PUI index by orthogonalizing PUI and these variables to measure the incremental explanatory power added to the model upon the addition of each new variable using the Gram-Schmidt procedure. The effect of the PUI index remains

[20] We obtain similar untabulated results for regressions including the VXO index and the forecast dispersion in GDP from the Philadelphia Fed Database but did not include the dispersion of the forecasts of CPI and inflation from the same source due to their high correlations with each other and the GDP forecasts. The estimated coefficients of these two variables are positive and highly significant in separate regressions and in regressions that included and excluded the PUI and whether or not the Gram-Schmidt method is used to orthogonalize these independent variables. In all cases, the estimated coefficients of the Std. of the PUI remain positive and highly significant.

large and significant in Column 10, confirming that the effects of policy uncertainty on credit spreads is robust to the influence of general economic conditions.

[Please place Table 3.8 about here.]

3.4.1.2 Economic Uncertainties

Another possible problem in causal interpretation between the PUI and credit spreads is that our results may be capturing general changes in the economic uncertainty and not the effects of policy uncertainty per se. The reason is that policy uncertainty may respond to changes in factors that influence general economic uncertainty. Such increases in economic uncertainty that coincide with rising policy uncertainty can be identified using certain events such as wars, elections, and recessions (Baker, Bloom and Davis, 2012; Bloom, 2014). Our regression results may therefore be under the influence of such omitted variables that influence policy uncertainty and credit spreads at the same time. To account for this possible problem, we need to confirm that our results still hold after conditioning on all such possible sources of increased economy-wide uncertainty. For this purpose, we control for a variety of economic uncertainty indicators, and show that the impact of the PUI on credit spreads is robust to such additional controls.

Our main candidate in this test is the VXO index. The VXO index is a general indicator of the economic uncertainties as capture by the implied volatilities of the S&P500 index firms. Moreover, Campbell and Taksler (2003) show that corporate credit spreads are largely affected by this index. As an additional measure of economic uncertainty, we include a measure of GDP forecast dispersion from the Livingstone Survey from the Philadelphia Fed. Higher forecast dispersion about GDP among professional forecasters indicates more uncertainty about economic conditions and thus can be used to capture an additional aspect of increased economic uncertainty not captured mechanically by VXO.

Further, according to Campbell and Taksler (2003) that firm-level idiosyncratic volatility highly affects its credit spreads and to rule out the possible influence of firm-specific uncertainties, we also include a firm's idiosyncratic return volatility as another control variable. We measure a firm's return volatility as the standard deviation of excess returns on the firm's stock minus the excess return on the CRSP value-weighted index over the previous 180 days.

Results are reported in Table 3.9. The first three columns report the results without including the policy uncertainty variable. In each of these columns we include one of the above measures of economic uncertainty at a time. The first column therefore controls for the idiosyncratic risk, the second column

includes the VXO index and the last column controls for the GDP forecast dispersion. Columns 4 through 6 repeat the same specifications but add the PUI index in the first row. Estimates of the PUI over columns 4 through 6 indicate that the influence of policy uncertainty on credit spreads is robust to the general economic uncertainty controls. When we compare the goodness of fit between 4, 5, and 6 and their corresponding columns 1, 2 and 3, we find that the adjusted r-squared increases 1% in all these columns after the inclusion of the PUI index. Another important observation based on this table is that all three measures of economic uncertainty also increase credit spreads significantly, corroborating the idea that increased uncertainty leads to higher credit spreads in general. In the last column, we include all three aforementioned measures of economic uncertainty, along with the PUI index. In this column, we have orthogonalized the policy uncertainty index to other indicators of uncertainty including idiosyncratic risk, VXO and GDP forecast dispersion to address possible collinearity between these determinants. As this column shows, the PUI estimate remains largely positive and significant, ruling out the effect of general economic uncertainties on our results.

[Please place Table 3.9 about here.]

3.4.2 Canadian Policy Uncertainty

One of the important limitations of the PUI index of Baker, Bloom and Davis (2015) is possible measurement error. It follows that although this index measures economic policy uncertainty, it may be capturing other things as well. For example, the PUI index may be contaminated by economic uncertainties or determinants that influence corporate credit spreads and are unrelated to policy uncertainty. While controlling for economic uncertainties in the previous section can partially address this concern, in this section we introduce a new test to account for any remaining concerns about measurement error in the policy uncertainty index, as suggested by Gulen and Ion (2015).

The idea is that Canada and US have closely related economies and there is a high trade activity between the two countries. In fact, US and Canada have the largest trade relationship in the world[21]. Many of the economic shocks that influence one of these countries, may well influence the other. Due to the relative size of the US economy, it is more likely that shocks to the US economy impact the Canadian economy. At the same time, policy uncertainty shocks are arguably contained more within sovereign boundaries.

[21] The CRS Report to the Congress in 2008 can be found at: http://www.nationalaglawcenter.org/wp-content/uploads/assets/crs/RL33087.pdf

This provides an opportunity to eliminate the part of the PUI index that is possibly capturing unrelated economic uncertainties. For this purpose we regress the US policy uncertainty on its Canadian counterpart and use the regression residuals as the alternative policy uncertainty index, after controlling for the series of macroeconomic controls. Our regression can be expressed as

$$USPUI_t = \gamma_0 + \gamma_1 CANPUI_t + \beta_3 MACROCTRL_t + \epsilon_t \tag{3.2}$$

Here, the $USPUI_t$ and $CANPUI_t$ are the Baker, Bloom and Davis (2012) US and Canada uncertainty indexes, respectively. The $MACROCTRL_t$ is a matrix of macroeconomic control variables including closest benchmark Treasury rate, S&P 500 index return, and the term slope. We use ϵ_t as the new policy uncertainty index and refer to it as the regression-based PUI ($RPUI_t$). The residual term of this regression is a much cleaner version of the original PUI in terms of possible contamination with irrelevant components. We use the following regression model to test whether our primary results using the PUI can be confirmed using the newly estimated RPUI:

$$\begin{aligned} & CREDSPREAD_{i,t} \\ &= \beta_0 + \beta_1 RPUI_{it-1} + \beta_2 FIRMCTRL_{i,t} \\ &+ \beta_3 BONDCTRL_{i,t}, + \beta_4 MACROCTRL_t + \eta_i + \epsilon_{i,t} \end{aligned} \tag{3.3}$$

Results are reported in Table 3.10. Similar to the main specification, we use firm fixed effects with monthly dummies and control for firm-level clustering. Based on this table, our results are robust to the choice of RPUI, as results across all panels are positive and highly significant. Results with this alternative measure are also robust to different controls including firm-level as well as macro level controls.

[Please place Table 3.10 about here.]

3.4.3 Instrumental Variable Analysis

In this section, we address any remaining endogeneity concerns that are not addressed in the previous sections. We use three different instrumental variables to further address the endogeneity concerns between policy uncertainty and corporate credit spreads. This test particularly addresses possible shortcomings in the three studies above. A possible limitation to the first study (controls for overall macroeconomic conditions) is that there may still be market condition determinants that are specific to bonds credit spreads, that are not captured using the above indicators including GDP, unemployment, inflation and consumer confidence. Same possible limitation applies to the second study that incorporates measures of general economic uncertainty. A potential concern here is that there might be other possible

sources of economic uncertainty that are specific to the relationship between credit spreads and policy uncertainty whose effects are not reflected in general indicators of macroeconomic uncertainty including VXO and analyst forecast dispersion. Finally, the third study that uses the regression residuals of US PUI on Canadian PUI may yet leave some contaminations unaccounted for. The political influences across the border can be arguably large and therefore some US policy uncertainties may translate into policy uncertainties in Canada as well. Moreover, there are a variety of economic shocks to Canada that are unrelated to those of the US.

To address the above limitations and thus further address any remaining endogeneity concerns, we use three instrumental variable specifications. Appropriate instrumental variables in our study should have a strong relationship with the PUI, and their influence on credit spreads should pass solely through the PUI.

We use the wealth of advances in the political science literature about policy settings and the relative legislative power of policy makers. Our main instrumental variable is the relative legislative power of the two major US political parties in each year. The related data comes from the Duane Swank (2013) database *Comparative Political Parties Dataset.* This database provides the relative legislative strength of different political parties across 21 countries between 1950 and 2011. This database categorizes the ideological position of parties in every country into Right, Center and Left. In the US, the Democratic and Republican parties are categorized as Center and Right leaning, respectively. Our main variable of interest here is the percent of legislative seats that are occupied by the each of these parties. The related variable for the former and latter are CENTGS and RIGHTGS, respectively. We compute the difference between these two variables as our main measure for the difference in power. The difference between these two variables, which we call DIFFGS, is therefore an indicator of the difference in the legislative power between Republicans and Democrats in every year.

The idea is that reduction in the relative difference of power of the two major political parties can make policy expectations more uncertain by making the resolution of sensitive issues and possible gridlocks more difficult, in both the House and Senate (Erikson, Wright, McIver, 1989; Baker, Bloom, Canes-Wrone, Davis and Rodden, 2015). In recent years, the control of the Senate and the House have switched frequently between the two parties, and presidential election races have tightened, feeding higher policy uncertainties in the economy Canes-Wrone and Park (2012).

On the other hand, there is no reason for expecting that differences in the power of major parties *directly* affects corporate credit spreads, making this measure a suitable candidate as an instrumental variable. Since we expect lower values of this index to lead to higher policy uncertainty, we multiply it by -1 throughout our studies. As expected, this measure is largely and positively correlated with the PUI index.

Our next instrumental variable is the political polarization of the two main parties by Poole and Rosenthal (1985). The DW-NOMINATE variable in this database measures the different parties' ideological positions over time. The updated 2015 database has the estimation of the DW-NOMINATE variable from the 1st to the 113th Congress as well as the polarizations in the corresponding senates. This variable estimates the ideological standing of US legislators based on their voting patterns. The political polarization has two dimensions in this database. The first dimension, as the authors argue, can be interpreted as the positions of legislators about government intervention in the economy, while the second dimension addresses the conflict between North and South on slavery during the related periods (before the Civil War), and civil rights for the African Americans (from 1930s to mid-1970s). Currently, almost all polarizations can be attributed to the first dimension, as discussed by the authors (Lewis and T. Poole, 2004; Carool, Lewis, Lo, T. Poole and Rosenthal, 2009). Thus, we use the first dimension as our second instrumental variable.

The final measure is calculated by subtracting the DW-NOMINATE of the Democratic party from that of the Republican party. We expect that higher polarization makes policy setting and law making particularly difficult. McCarty (2012) argues that with more polarization, building of legislative coalitions and resolving gridlocks become more difficult. Thus, all else held equal, one can expect that higher levels of political polarization are associated with higher uncertainties about future policies. As argued above, there is no direct link between such political polarizations and corporate credit spreads. This theoretically validates the choice of the second instrumental variable.

We create the third instrument as the interaction between the two above variables. This is done to mitigate further concerns about how well the other two instruments can impact policy uncertainty. On one hand, an increase in political polarization by itself may not necessarily indicate higher policy uncertainty, particularly if one party is significantly stronger than the other in a country's political environment. In this scenario, although there is little overlap between the ideological stance of each party's legislators, the party with more legislative power can smoothly pass its desired laws. This in turn diminishes the uncertainty about prospective policies, regardless of what types of policies would be decided or implemented. On the other hand, the closeness in the legislative power of parties by itself may not be a sufficient indicator of higher policy uncertainty, particularly if there is not much real ideological difference between the two parties, i.e. if there is low political polarization.

The interaction of these two variables therefore creates an interesting instrument that combines both dimensions. Increases in this third instrument indicate higher levels of political polarization as well as closer legislative strength that intuitively necessitates higher and more severe policy uncertainty. With the same reasons as above, there is no direct link between this interaction term and credit spreads, validating its selection as a proper IV. The second stage regression results are reported in Table 3.11. In the first

column, the DIFFGS variable is used as the instrumental variable. In the second column both DIFFGS and political polarization are the instrumental variables. In the third column, we use the interaction term between DIFFGS and the political polarization as the IV. The table confirms the large and significant influence of policy uncertainty, using all the different instrumental variables, on credit spreads. The F-statistics across all models are large, ruling out the possibility of weak instruments in any of the settings.

[Please place Table 3.11 about here.]

3.5 POSSSIBLE MECHANISMS

In this section, we explore through what mechanisms policy uncertainty can impact corporate credit spreads by studying the effects of policy uncertainty on different cross-sections of firms. The related literature suggests that changes in policy uncertainty can have heterogeneous impacts on firm cross-sections. Particularly, our studies in this section shed light on two mechanisms through which policy uncertainty affects corporate decisions. The first mechanism, suggested by Bernanke (1983) and Rodrik (1991), argues that firms respond to increased policy uncertainties through postponement of positive NPV investments when investments are irreversible, until the uncertainty is further resolved. The second mechanism, suggested by Gulen and Ion (2015), argues that uncertainty about government policies can impact firms through affecting their expected sales to the government sector.

The primary mechanism argues that if a firm's investment opportunities are perfectly reversible then the firm would have no incentive to postpone them in high policy uncertainty periods since the firm can always halt and reverse its investments without incurring costs, in the case of an adverse policy outcome. Postponement of profitable projects adversely affects the cash flows of firms, can in turn deteriorate their ability to fulfil debt related obligations, and thus increases credit spreads. Whether this mechanism explains the influence of policy uncertainty on credit spreads can be tested by exploring whether changes in PUI has a larger effect on corporate credit spreads of firms with more irreversible investments.

The second mechanism can be explored in the cross-section of firms with different dependences on government spending. For example, firms in the defence industry have a higher exposure to changes in government policies since the largest buyer of their output by far is the government sector. In this regard, it is imperative that the sensitivity of a firm's sales to the government should influence its sensitivity to policy uncertainty. In the rest of this section, we test the above possibilities.

3.5.1 Investment Irreversibility

When physical capital is required for investment, particularly as capital needs to be moved or committed across industries (Rodrik, 1991), capital investment becomes partially irreversible. Of course, firms have different levels of investment irreversibility based on their industries and styles of investment since allocation or redemption of capital is associated with sunk costs. As Rodrik (1991) and Bernanke (1983) argue, managers have incentives to postpone investment decisions when policy uncertainty is high to be able to make more informed decisions at more favourable market circumstances.

These studies argue that, if all else is held equal, higher policy uncertainty ex-ante provides more incentives for the postponement of positive NPV projects. Postponing profitable projects hinders firm growth, and can thus adversely influence corporate cash flows. From a structural credit risk perspective (Leland and Toft, 1996), this will affect a firm's capacity for debt repayment and hence increase its risk of default by adversely influencing the drift, which in turn translates into higher credit spreads. That being the case, we expect to observe that the credit spreads of firms with more irreversible projects react more positively to increases in policy uncertainty.

We use four different measures of investment irreversibility to test the above prediction. Frist, we construct a capital intensity index, as the ratio of Property Plant and Equipment (PPE) to total assets (AT). As argued by Rodrik (1991), the irreversibility of projects increases when more physical investment is needed. This assumes that when capital intensity is high, firms need to incur large upfront costs. However, as Kessides (1990) argues, this measure may be muddled by the existence of an active market for second-hand assets. Thus, we recognize that this measure may not factor in other related determinants of the adjustment costs. We use three additional measures to address the shortcomings of this measure. We construct a saleability index for each industry, a measure of industry-level cost sunkness, and finally, a measure of sales cyclicality.

For the second measure, we create a saleability index for each industry as proposed by Kim and Kung (2013). This index indicates how easily the industry-specific assets can be sold to firms in other industries. With easier sales of an industry's assets to other industries, we expect higher liquidation values (Gulen and Ion, 2015). To construct this index, we use the Bureau of Economic Analysis (BEA) capital flows data of 1997. These tables contain data on 180 asset classes across 123 industries. Specifically, these tables shows the total value of each of these asset classes used in any of the 123 industries, based on their NAICS industry classifications.

To construct the saleability index, we do the following. First, we find what percentage of industries use a particular asset. For this purpose, we assign dummies of 1 when the use of an asset class in an industry is greater than zero, count the number of dummies per asset class and then divide this number by

the total number of industries. This procedure yields the "redeployabiliy" index. After the redeployabiliy for each *asset class* is assigned, we can compute each *industry's* redeployabiliy index as the weighted average of the redeployabiliy of its assets. The weights used in this calculation are the percentages of the dollar amounts an industry invests in each of the 180 assets classes. When asset redeployability is higher for an industry, it means that it can liquidate its assets more straightforwardly and thus it suffers less from the problem of investment irreversibility.

Next, we construct an industry-level index of cost-sunkness (Kessides, 1990; Rodrik, 1991; Farinas and Ruano, 2005). The reason is that firms that rent higher portions of their physical assets should have lower sunk costs and thus a measure of cost-sunkness can be constructed using a firm's PPE and rent expenses. Moreover, the related industrial organization literature argues that firms with rapidly depreciating assets, and firms with more liquid second-hand markets have lower sunk costs. For the former, we use a firm's depreciation expenses and for the latter, we use sales of plants, property and equipment (PPE) over the past 12 months. Further, we normalize all these measures by the current PPE. Then we aggregate these measures for every industry based on the first two digits of the SIC code. Finally, following Farinas and Ruano (2005) and Gulen and Ion (2015), we aggregate these three measures into one index. This index is constructed as follows: at any period, the index can take three values of 2, 1 or 0. The index equals 2 under the condition that all three proxies for an industry are below the median. The index equals 0 when an industry has all these proxies above the cross-sectional median. An index equal to 1 represents the remaining possibilities. This indicates that when the index is higher, the sunk costs are higher, and thus the related firms have more irreversible investments.

For the fourth and final measure, we construct a sales cyclicality index. We expect that industries with higher sales cyclicality have more irreversible investments. The logic is that firms that belong to highly cyclical industries get affected by negative shocks rather simultaneously and therefore distressed asset sales become increasingly difficult in such industries (Ericsson and Renault, 2006; Schleifer and Vishny, 1992). The loss in recovery rates due to the simultaneous influence of negative shocks thus increases the investment irreversibility for such firms.

To construct the measure of sales cyclicality, we do the following. First, we compute the correlation between firm sales and GNP over the length of our sample. Then, we take the average of the correlation for every industry using the first two digits of the SIC code. Next, we use a dummy indicator that equals one if the average correlation for an industry is above the cross-sectional mean and zero otherwise.

We use the interaction of the above four measures with the policy uncertainty index to test the idea of investment irreversibility. Particularly, if the postponement of profitable projects in response to higher uncertainty can be explained by investment irreversibility, then we expect a positive sign for all four interaction terms in the following regression:

$$CREDSPREAD_{i,t} = \beta_0 + \beta_1 PUI_{i,t-1} . IR_{i,t-1} + \beta_2 IR_{i,t-1} + \beta_3 FIRMCTRL_{i,t} + \beta_4 BONDCTRL_t + \beta_5 MACROCTRL_t + \eta_i + \epsilon_{i,t} \quad (3.4)$$

where $PUI_{i,t}$ is the policy uncertainty index, $IR_{i,t}$ represents any of the four measures of irreversibility introduced above, $FIRMCTRL_{i,t}$ is the matrix of firm-level control variables, and $MACROCTRL_{i,t}$ is the matrix of macroeconomic controls. η_i captures the firm fixed effect and $\epsilon_{i,t}$ is the error term. In our results, we run this model once for each of the four proxies above (IR). Results are reported in Table 3.12.

[Please insert Table 3.12 here]

Columns 1 through 4 in Table 3.12 study the credit-spread effects of saleability, cyclicality, the capital intensity index (PPE/AT), and finally, the cost sunkness index. In each of these columns, the estimations of these variables and their interactions with PUI are reported. As explained before, we expect positive signs on the interaction terms if the irreversibility hypothesis is supported. As the table shows, our prediction is supported in all columns, with positive and highly significant estimates especially for cyclicality and cost sunkness indexes. These results show that an increase in credit spreads can be explained partially by the postponement of profitable projects.

3.5.2 Dependence on Government Spending

The second mechanism by which policy uncertainty can create a cross-sectional heterogeneous response in credit spreads is through a firm's dependence on government spending. Holding all else constant, we expect that the credit spreads of firms with more revenue sensitivity to government spending are more sensitive to changes in policy uncertainty. Firms for which revenues largely depend on government contracts are of prime importance here, since the same level of increase in policy uncertainty deteriorates their future incomes at a larger magnitude compared to other firms. This reduces income levels and thus adversely affects their capacity to repay debts. This escalates default probabilities, and credit spreads. Thus, we expect an increase in credit spreads in response to higher levels of policy uncertainty to be more severe for firms with higher dependences on government spending.

To test the above hypothesis, we construct an index to capture such dependence to government spending using the method of Belo, Gala and Li (2013). In their method, Belo et al. (2013) quantify an industry's exposure to government spending using the Benchmark Input-Output Accounts of the United

States from the Bureau of Economic Analysis website. In our paper, we use the 2014 version of this data that adds updates to industry classifications. There are two tables in this dataset. The first table is called the "use table", which contains the dollar amount of sales from every industry to the other, using 15 NAICS classified industries. The second table is called the "required table", that depicts the dollar amount of input from different industries into any industry to produce one dollar of final output, i.e. the industry's commodity.

We use Leontief method to compute the final index. To start, we assume that there are I industries in our setting. Each industry i can produce a certain value of produce, from which x_{ij} is used by industry j and the rest is consumed as final use which we denote by c_i. We can rewrite this argument formally as:

$$\sum_{j=1}^{I} x_{ij} + c_i = x_i \tag{3.5}$$

where x_i is the industry-specific production, and depends on all the inputs to the industry. If we assume that the industry-specific output depends linearly on the industry's input from other industries, we can write:

$$x_{ij} = b_{ij} x_j \tag{3.6}$$

where b_{ij} is the matrix of commodity transfers between industries, called the matrix of Leontief coefficients. From (5) and (6) we can write:

$$x = (1 - B)^{-1} c \tag{3.7}$$

In (7), c is the final use by any entity in the economy. Here we are only interested in the final use by the government. From the *use* table, the government's final use can be obtained from column F100 that includes all final uses by the government including federal, state and local governments. So our estimation method follows the following steps. First, we record how much each industry sells to the government for the final use. Next, we compute the $(1 - B)^{-1}$in the above equation (3.7). Now we have the right-hand-side in equation (3.7) and therefore we can estimate x, that is a vector of outputs required by each industry to fulfill the final demand of all governments. If we divide x for any respective industry by y that is the total output of that industry, we obtain the industry's sensitivity to government consumption. We use the following regression model to test the relevance of the sensitivity of credit spreads to government spending:

$$CREDSPREAD_{i,t} = \beta_0 + \beta_1 PUI_{i,t-1} . DGS_{it} + \beta_2 DGS_{it} + \beta_3 FIRMCTRL_{i,t} + \beta_4 BONDCTRL_t + \beta_5 MACROCTRL_t + \eta_i + \epsilon_{i,t} \quad (3.8)$$

where DGS is the dependence of firm *i*'s industry to government spending. If our hypothesis that more reliance on government purchasing leads firms to become more sensitive to policy uncertainty, then we expect that the sign of the interaction of *PUI* and *DGS* will be positive. Results are presented in the Panel B of Table 3.12. As expected for our hypothesis, there is a large, positive and significant estimate both for *DGS* and its interaction with the *PUI*. Overall, results suggest that the increase in policy uncertainty further influences the credit spreads of the firms with more dependence on government spending.

3.6 EFFECTS OF POLICY UNCERTAINTY ON THE COMPONENTS OF CREDIT SPREADS: DEFAULT PROBABLITY AND CDS-BOND BASIS

In this section, we explore how and through what components policy uncertainty affects corporate credit spreads. Corporate credit spreads can be roughly categorized into two components: (a) a component that captures default spreads and thus can be estimated using credit default swap (CDS) spreads, and (b) the difference between credit spreads and the firm-specific default component that is referred to as Bond-CDS spread in the literature. We are particularly interested in documenting the effects of policy uncertainty on the former since it provides an opportunity to test our primary hypotheses that a main mechanism by which policy uncertainty influences credit spreads is through elevating corporate default probabilities. This increase in default probabilities, as we argued in previous sections, is through reduced cash flows from either delayed investments or uncertainty about sales to the government sector. If policy uncertainty affects default probabilities, then it provides evidence for our proposed mechanism that an increase in corporate credit spreads in response to higher policy uncertainty can be partially explained by the deterioration in firm's capacity to repay its debts.

Studying the reaction of Bond-CDS basis determines whether changes in policy uncertainty have any systematic effects on credit spreads. This is possible since bonds and CDS's are not perfect substitutes. In other words, we should be able to replicate CDS spreads by shorting a risky floating-rate note and holding a default-free bond (Duffie, 1999; Fontana, 2011). Thus, if market frictions are nonexistent, we expect that regardless of a bond's default rate the CDS spread is perfectly connected to the bond spreads (basis). In reality, however, this is not the case. The main reason for this difference is that since CDS's are highly liquid assets their prices are almost solely influenced by default probabilities. Corporate bonds, on the other hand, have more sources of risk including interest rate risk, the risk of default, market liquidity risk

and funding liquidity risks (Longstaff, Mithal and Neis, 2005). Subtracting the risk-free rate and CDS spreads from the total yield eliminates the first two risk factors, leaving mostly liquidity and possibly other market-wide risks to influence the remaining spread. Therefore, studying the effect of policy uncertainty on Bond-CDS basis captures systemic effects from increases in the PUI on credit spreads.

A direct way to measure default probabilities is through investigating the micro-level credit default swap (CDS) spreads. Since the CDS spreads are by construction influenced by the probability of issuer's default, we can directly interpret higher such spreads as higher default probabilities and vice versa. We obtain firm-level CDS spreads at different maturities from the Markit database. Next, we categorize spreads for different maturities into 1-year, 3-year, 5-year, 10-year and 20-year to maturity groups. We merge the resulting dataset by ticker symbol and company names with our main database. Since our main dataset is monthly, we take monthly averages of spreads in each of the maturity groups for each of the sample firms in each month. We expect that policy uncertainties will be resolved over the short-run, i.e. in less than a year, so our main CDS spreads of interest are the 1-year spreads. We repeat our base regressions for 1-year CDS spreads as the dependent variable. The regression model is as follows when $CDS_{i,t}$ is the one-year maturity CDS spread for each firm:

$$CDS_{i,t} = \beta_0 + \beta_1 RPUI_{it-1} + \beta_2 FIRMCTRL_{i,t} + \beta_3 BONDCTRL_{i,t} + \beta_4 MACROCTRL_t + \eta_i + \epsilon_{i,t} \quad (3.9)$$

We compute the Bond-CDS basis as the difference between bond and CDS spreads. We note that bond spreads in this method are merely credit spreads, since they are computed as the difference between bond yields and the risk free rate as in Hull, Predescu and White (2004) and Fontana (2011). The related regression model for Bond-CDS basis can be expressed as:

$$SPREAD_{i,t} = \beta_0 + \beta_1 RPUI_{it-1} + \beta_2 FIRMCTRL_{\mathrm{i},t} + \beta_4 BONDCTRL_t + \beta_5 MACROCTRL_t + \eta_i + \epsilon_{i,t} \quad (3.10)$$

We report the results in Table 3.13. This table repeats our base regression with CDS spreads and Bond-CDS spreads as its dependent variables in odd and even columns, respectively. The first two columns report the univariate regression results using each of the above components at a time, and the next two columns add firm, market and macro-level controls. The table shows that in response to an increase in policy uncertainty, both default probabilities (CDS spreads) and the liquidity/market risk premiums increase significantly. The goodness of fit of the model is better, and the overall effect of the PUI variable after different controls is larger with the Bond-CDS spread regressions, suggesting that the market-wide risk premiums are influenced more by policy uncertainty. Results indicate that the response of credit spreads to policy uncertainty comes from both firm-level default probabilities and market-wide risk premiums.

[Please insert Table 3.13 here]

3.7 ROBUSTNESS TEST: ALTERNATIVE MEASURES OF POLICY UNCERTAINTY

So far, we have shown why the PUI index of Baker, Bloom and Davis (2015) is an appropriate measure for policy uncertainty using multiple methods and across different studies. In this section, we add one final dimension to the above examinations by performing a comparative study across the PUI of Baker, Bloom and Davis (2015) and other possible proxies of policy uncertainty from the literature. The purpose of this study is two-fold. The first objective is to confirm whether the effect of the PUI on credit spreads is robust to inclusion of other proxies of policy uncertainty. Our second objective is to study how well each of the other uncertainty proxies influence credit spreads in comparison to the PUI.

The related literature suggests policy uncertainty proxies in three broad categories including monetary, fiscal and government policies. The monetary proxies include unanticipated consumer credit and M1 growth (Aizenman and Marion, 1993) and unanticipated inflation (Fischer, 1991; De Gregorio, 1992; Edwards and Tabellini, 1990). The fiscal proxies include fluctuations in the terms of trade and surplus-deficit (Aizenman and Marion, 1993) and government consumption to GDP. The government policy proxies include the election indicator used previously, real GDP growth, and public service to GDP. We compute the unexpected component of a variable as the value of the variable minus its expected value based on a simple AR(1) estimation, and the uncertainty associated with a variable as the standard deviation of the error term from the AR(1) estimation.

From the single-factor regressions (columns 1 to 10) reported in Table 3.14, we observe that public service to GDP, unanticipated consumer credit and unanticipated inflation have decreasing effects on credit spreads. An increase by one standard deviation for these independent variables reduces credit spreads by more than 11.70, 6.78 and 18.57 bps. Other determinants have positive effects on credit spreads, and the largest effect is due to increases in the real GDP variance where a one standard deviation increase raises credit spreads by almost 30 basis points.

[Please place Table 3.14 about here.]

Interestingly, the effects of the PUI index on credit spreads remain large and highly significant across all specifications. One standard deviation increase in the PUI is generally associated with around a 25 bps increase in credit spreads across all specifications. Results of the regression setting including all proxies as well as the PUI index is reported in column 9. In this specification, we account for the correlations between these alternatives by obtaining estimates after orthogonalizing all variables using the Gram-Schmidt procedure. Results show that even after accounting for monetary, fiscal and government policy

uncertainties simultaneously, the estimated coefficients of the PUI remain large and highly significant.

3.8 CONCLUDING REMARKS

In this paper, we study the impact of economic policy uncertainty on the credit spreads of corporate debt in the US market. Using a comprehensive panel covering the period from 2002 to 2012, we find economically large and statistically positive and significant influences from policy uncertainty on credit spreads. Our main measure of policy uncertainty is the Baker, Bloom and Davis (2015) index of economic policy uncertainty. We find that an increase in policy uncertainty leads to large increases in credit spreads. Using data on corporate CDS spreads from the Markit database, we find that policy uncertainty affects credit spreads through its impact on firm-specific default probabilities as well as the effect of policy uncertainty on market-wide bond risk factors such as market liquidity.

We shed light on possible mechanisms through which policy uncertainty may impact credit spreads and document two possible channels. Using different measures of investment irreversibility, we find that the first channel is the postponement of investment decisions in response to escalated uncertainty. Using US I-O Accounts from the Bureau of Economic Analysis and based on a Leontief analysis, we show that another mechanism acts through the effect of deteriorations in sales prospects to the government sector, particularly for industries with higher reliance on government spending.

To mitigate the effects of possible endogeneity problems, we address possible effects of business cycles and other sources of economic uncertainty by including related controls. We set up three different instrumental variable settings using: (a) the relative legislative strength of the two main political parties, (b) the level of ideological polarization between the two main political parties and (c) the interaction of these two proxies, as instruments for policy uncertainty. Our results are also robust to bond market, firm, industry and macroeconomic controls as well as alternative controls for economic uncertainties and changes in business cycles. Our results are also robust to the inclusion of other proxies of policy uncertainty discussed in the literature including monetary, fiscal and government policy related uncertainties.

Chapter 4:

How Large Are the Costs and Benefits of Credit-Rating Changes?

4.1 INTRODUCTION

Based on survey findings, Graham and Harvey (2001) report that maintaining a good credit rating is the second-highest priority when U.S. CFOs make capital structure decisions, just marginally behind the interrelated rationale of "financial flexibility".[22] In this paper we argue that such corporate behavior is consistent with the conjecture of Kisgen (2006) that every downward credit-rating movement is reflected in actual capital structure decisions because it can impose a certain cost on the firm prior to distress or bankruptcy. These costs include higher interest costs on new debt, restricted access to other financial markets (such as commercial paper), heighted bond disclosure requirements (more stringent for speculative-grade bonds), and more stringent bond covenants. This paper aims to measure the costs of credit-rating deterioration to the value of the firm's capital (henceforth CCRD).

According to Graham (2000), the classic trade-off theory fails to account for the low leverage ratios for the majority of U.S. firms after accounting for distress or bankruptcy costs and the tax benefits of debt. One solution to this so-called under-leverage puzzle is to account for the costs of debt prior to the point of default and show that these costs accrue to firm value if firms diverge from their optimal capital structures (Altman, 1984; Titman, 1984; Opler and Titman, 1994; Elkamhi et al., 2012). This leads to the following question: Can costs to the firm-value incurred prior to financial distress or bankruptcy be measured using the costs of credit-rating deteriorations? To answer this question, this paper pursues the objective of determining if the costs and benefits of credit-rating changes are economically large and statistically significant.

We use corporate bond-rating changes, and particularly sequential downgrade (upgrade) events to measure a series of costs (benefits) associated with debt prior to the point of default. These effects are not addressed in the existing capital structure literature most likely because the estimation of such costs to firm value prior to default is not straightforward. An argument in the literature (e.g., Andrade and Kaplan, 1998) maintains that financial and not economic costs need to be accounted for in determining the level of

[22] Graham and Harvey (2001) also find that U.S. CFOs assign a very low level of importance to bankruptcy and distress costs (the major costs in classic trade-off models) compared to credit ratings. Further, they find that debt issuance costs are near the bottom of the list of CFOs. This challenges the assumptions of the dynamic trade-off models that firms diverge from their optimal leverages due to financing costs (Bhamra, Kuehn, and Strebulaev, 2010; Strebulaev, 2007).

debt in the capital structure ex-ante. Financial costs are those that firms incur due to more debt such as higher interest expenses, probability of distress, and bankruptcy, while economic costs are those that are independent of the level of debt such as costs due to changing sales, production, and economic conditions. We extend this argument to the case of CCRD, since credit-rating declines and firm defaults can be due to both types of costs.

We examine mixed "economic" and "financial" credit-events (upgrades or downgrades) combined and the latter separately to study the relative size of these costs and benefits. We examine the economic value impacts of announcements of credit-rating changes that are not contaminated by confounding events for all non-financial firms included in the COMPUSTAT database over the period from the introduction of TRACE for bonds in 2002 to 2012. From this population of non-financial firms in COMPUSTAT, we draw two undifferentiated samples of S&P downgrades and S&P upgrades (hereafter all samples) in order to compute estimates for the costs (benefits) of credit deteriorations (improvements). To determine if credit events with primarily financial causes have different economic-value impacts, we examine samples of upgrades and downgrades due primarily to financial causes. These latter two samples consist of those firms with loan records in the DealScan database with interest rates in excess of Libor plus 200 bps similar to a selection procedure used by Lerner, Sorensen, and Strömberg (2011) (hereafter referred to as high-yield loan or HYL samples). When examining the economic-value impacts of the credit events for all four samples, we use market values for not only equity but also bonds unlike previous studies (e.g., Andrade and Kaplan, 1998).

We find that the impact of credit-rating changes is asymmetric. Deteriorations (upgrades) are associated with high (relatively small) and significant costs to a firm's value. The average costs to firm value for a one-notch move to or within the speculative and investment grade credit-rating categories are -4.1% and -6.5%, respectively, for downgrades, and 3.1% and 4.2%, respectively, for upgrades. We find that financially downgraded firms incur higher costs than the undifferentiated sample. The costs also are higher for firms in our HYL sample (i.e., firms downgraded primarily due to financial reasons) at -14.8% and -7.1% for speculative and investment grade debt, respectively, than those reported for the sample undifferentiated by the cause of the downgrade (i.e., economic or financial). Elkamhi, Ericsson, and Parsons (2012) suggest that a relatively continuous annual decline in firm value prior to bankruptcy of only 1% or 2% should be large enough to resolve the underleverage puzzle. Using a 15% discount rate, a 1% continuous annual decline in value over a 10- and over a 20-year period is equivalent to a present day decline of 5.0% and 6.3%, respectively.

Since credit-rating changes may be anticipated by the market and incorporated into firm values prior to their announcements, we quantify prior anticipations about changes in credit quality using a model-generated credit rating. We find that the model-implied credit-quality downgrades (upgrades) lead to

more muted decreases (increases) in firm financial performances and values. Assuming that our model is appropriate, these smaller in magnitude costs prior to actual credit-event announcements suggest that such announcements are only partially anticipated by market participants, and hence that their "value effects" are concentrated more at the time of an actual credit-rating change.[23]

Finally, we use an event study methodology to measure the financial costs of single- and multiple credit-rating changes more rigorously. We first use a propensity score matching method (Dehejia and Wahba, 2002) based on the propensities of firms to obtain a high yield loan (HYL). We then use the matched non-HYL sample as the control group and the HYL sample as the treatment based on the conjecture that total risk consists of more financial than business risk for the former sample and vice versa for the latter group. We find that the cumulative costs (benefits) of credit-rating deteriorations (improvements) can be as large as 15.1% (5.8%) to firm value.

Thus, this paper makes a number of important contributions to the capital structure and credit-rating literature. First, we are able to provide supportive evidence for the relative importance of credit ratings for CFOs documented by Graham and Harvey (2001) by measuring the costs and benefits of credit-rating changes on firm values. Second, we revisit the cost of default examination of Andrade and Kaplan (1998) by incorporating the market value of debt instead of its book value to measure the cost of credit-rating downgrades (CCRD). Our much larger high-yield loan (HYL) sample compared to the 31 LBOs studied by Andrade and Kaplan (1998) should alleviate to some extent the downward selection bias attributed by Davydenko, Strebulaev, and Zhao (2012) to the findings of Andrade and Kaplan (1998). The bias occurs because these firms may have become highly leveraged due to their expectations and those of their lenders that the likelihood of default was abnormally low. By comparing the relative costs for our HYL sample which proxies for the financial cost of CCRD with the "all" sample which proxies for the mixed financial/economic costs of pre-default downgrades, we are able to address this downward bias.

Third, we provide the underlying basis for using CCRD as a reference point for measuring the pre-default costs of debt. Specifically, we show that CCRD appear to be large enough to help explain the underleverage puzzle. Our results explain the variation in leverage ratios in a cross-section of firms where larger, more profitable firms have lower leverage ratios (Graham and Leary, 2011). Our results also contribute to the zero-leverage argument of Strebulaev and Yang (2013) by adding substantially to the empirical costs of debt prior to default. Both studies report that larger, more profitable, and better rated firms tend to have lower (or zero) leverages. We conjecture that these firms face a longer expected

[23] Since the number of model-implied credit events is much larger than the number initiated by the credit agencies, the lower magnitude of CCRDs may be the result of a dispersion of the deterioration costs across multiple model-implied credit-rating changes.

sequence of CCRD instances prior to uncertain default or no sequence at all because they generally have higher initial credit-rating quality that maintain greater stability over time.

The remainder of this paper is organized as follows. Section 4.2 briefly reviews the related literature on the market effects of credit ratings and their changes. Section 4.3 describes the samples, data, summary statistics and the computations of debt and equity values. Section 4.4 examines the efficacy of our high-yield loan (HYL) samples as proxies for "pure" financial distress. Section 4.5 examines the economic value effects of S&P credit-rating changes. Section 4.6 reports some robustness tests using a model-implied credit change identification, and for tests that control for the effects of business-risk and other firm-specific variables. Section 4.7 concludes our paper.

4.2 EFFECTS OF CREDIT- RAING CHNAGES ON CAPITAL STRUCTURES AND FIRM VALUES

4.2.1 Credit-Rating Changes and Capital Structures

This section briefly reviews the effect of credit-rating changes on debt and equity prices and shows how announcements of credit-rating changes can affect a firm's capital structure and firm value. Some studies examine how credit ratings influence firm values, capital structure decisions and corporate financing behavior. Credit-rating downgrades increase bond yields (Wansley, Glascock, and Clauretie, 1992), and have a greater effect on speculative versus investment grade bonds and compared to upgrades (Hite and Warga, 1997; Steiner and Heinke, 2001, for Eurobonds). Firms issue less debt and more equity near credit-rating announcements (Kisgen, 2006). Fallen angels choose lower debt levels after downgrades, and exhibit no significant debt-structure changes prior to such events (Ruah and Sufi, 2010).

Several studies examine the informational value of credit ratings. West (1973) finds that credit ratings can predict bond yields even beyond the information contained in general financial variables. Klinger and Sarig (2000) conclude that unexpected rating changes have information content for investors. Elton et al. (2001) conclude that ratings have real information content based on an examination of bond prices across different rating categories. Caton and Goh (2003) find that the reduction of earnings expectations for a downgraded firm and its competitors depends on the initial credit rating and the magnitude of the change. The information content of rating changes is mainly attributed to the amount of resources, expertise and access to non-public information that are used by rating agencies when they make credit-rating changes (Boot, Milbourn, and Schmeits, 2006).

Credit-rating downgrades are more relevant than upgrades in terms of the relative magnitudes of their effects on debt costs. Downgrade unlike upgrade announcements have immediate effects on stock returns

(Hand, Holthausen, and Leftwich, 1992b; Goh and Ederington, 1993). Markets (do not) react to anticipated (upgrades) downgrades (Grier and Katz, 1976) or react faster to downgrades than upgrades (Hand, Holthausen, and Leftwich, 1992b; Goh and Ederington, 1993).

Some studies conclude that information about a firm's credit quality is incorporated into market prices prior to rating-change announcements. These findings not only reduce the expected significance of credit-rating events but they also suggest that there may be other points in time for determining the costs associated with credit-rating changes other than on these event days. For example, Weinstein (1977) finds that asset prices change between 18 and 7 months prior to rating announcements. Matolcsy and Lianto (1995) find that some credit-quality information is reflected in prices prior to rating announcements and that announcements of rating downgrades (unlike upgrades) contain new information.

4.2.2 Credit Rating Changes and the Underleverage Puzzle

To provide a basis for our conjecture that our study has implications for providing a possible explanation of the underleverage puzzle, we first discuss the challenges encountered in measuring the costs of debt (at or before distress) and then show how our approach helps fill this void in the relevant literature. We begin with a discussion of three influential papers that provide estimates of the costs of acute financial distress or bankruptcy. Based on a small sample of 31 leveraged buyout (LBO) firms that subsequently became financially distressed, Andrade and Kaplan (1998) report that the ex-post capitalized costs of distress range from 10% to 23% (median of 16.5%) of total value just prior to the onset of distress.

The two papers that examine ex-ante estimates arrive at seemingly conflicting conclusions about whether the magnitudes of these costs are sufficiently large to explain the under-leverage puzzle. Using a risk-neutral distribution from bond yields to discount the Almeida and Kaplan's 16.5% ex-post distress costs, Almeida and Philippon (2007) conclude that the ex-ante cost estimates of 4% to 6% of firm value at the present point in time (even if it is not close to the onset of distress) are sufficient enough to offset the tax benefits of debt. In contrast, Elkamhi, Ericsson, and Parsons (2012) find that the ex-ante distress costs for a sample of bankrupt firms at the time of default do not exceed 1% of current firm value and thus are too small to cancel out the tax benefits of debt.

Thus, a potential approach to further address the under-leverage puzzle is to measure debt costs before default from changes in credit quality. Some pre-default costs identified in the literature include damaged relationships with stakeholders, loss of market share (Zingales, 1998; Opler and Titman, 1994), supplier frictions (Titman, 1984; Banerjee, Dasgupta, and Kim, 2008), predation by competitors (Bolton and Scharfstein, 1990), fire sales of corporate assets (Pulvino, 1998) and risk shifting (Eisdorfer, 2008).

However, it is difficult to link these costs to the trade-off model due to difficulties in their measurement (Altman, 1984), timing, and predictability, and heterogeneity across firms.

These difficulties suggest the need for a more precise measure of "pre-default" costs. We propose that the credit deterioration thresholds associated with the costs of credit-rating downgrades (CCRD) serve this purpose. The CCRD provide a well-ordered and empirically tractable measure of the costs of debt in the capital structure prior to default and can help reconcile the long-standing debates discussed above about the underleverage puzzle. The timing of credit-rating changes by the credit-rating agencies is known, discrete and not subject to debate. The measurement of their impact on a firm's value can be measured using the market prices for a firm's traded financial instruments. Credit-rating changes between announcements can be predicted using various structural models. Finally, the measures capture firm heterogeneity due to firm-specific differences in the probabilities and costs associated with financial distress. A practical side benefit is that these costs can provide an appropriate measure for CFOs and investors to understand how bond markets react to credit-rating changes.

4.3 SAMPLE, DATA AND DESCRIPTIVE STATISTICS

4.3.1 Sample and Data

To test the static trade-off theory, one needs a reliable approximation of the costs associated with debt that are incurred purely due to financial reasons. A major concern in the related literature (Almeida and Kaplan, 1998; Davydenko, Strebulaev, and Zhao, 2012; Elkamhi, Ericsson, and Parsons, 2012) is that the "pure" financial costs of debt are difficult to identify empirically since financial distress (inability to meet required debt payments) typically occurs simultaneously with economic distress (deteriorating economic fundamentals). To disentangle these two determinants of distress, Andrade and Kaplan (1998) examine a sample of leveraged-buyout (LBO) firms that eventually defaulted. They argue that, since these firms represent a sample whose default is primarily due to financial reasons, their default costs can proxy for the financial costs associated with debt.[24] Nevertheless, they note that this approach may yield *downward-biased* estimates of debt costs; mainly because these firms may have chosen to become highly leveraged due to the abnormally low expectations of their default. Davydenko, Strebulaev, and Zhao (2012) posit that this bias can be accounted for by not unbundling the two costs. While this approach yields higher estimates of the costs of debt, the firm-value costs associated with changes in economic and financial factors both jointly and separately would better capture the decision-making process of corporate

[24] Andrade and Kaplan (1998) and other papers assume that the costs of debt materialize only at the point of distress.

managers when making capital structure decisions. In turn, this should improve the tests of the efficacy of the trade-off model, for example, in explaining deviations from target leverages.

Thus, we still need to obtain an estimate of the financial costs associated with debt, particularly "prior" to an actual default event. To this end, we initially draw two samples of non-financial firms (i.e., those without SIC codes between 6111 and 6999). The first ("all") sample drawn from all remaining Compustat firms is used to compute our estimates for the costs (benefits) of credit deteriorations (improvements) undifferentiated by whether the cause of the downgrades (upgrades) is due to changes in the likelihood of more pure financial or mixed financial/economic distress. We use a second sample of firms with high-yield loans (HYL sample hereafter) as a proxy for firms with relatively higher "financial distress" costs of debt.[25] Using a selection procedure similar to Lerner, Sorensen, and Strömberg (2011), these firms are drawn from the DealScan database if they have loans carrying interest rates that exceed Libor plus 200 bps based on the "AllInDrawn" variable.

All the corporate credit-rating data available in the S&P database at WRDS from 2002 to 2012 is split into upgraded and downgraded samples. The credit ratings are changed to numerical ratings as in Lerner, Sorensen, and Stromberg (2011) by assigning 1 to the highest rated category (AAA), 2 for AA+, and so forth and ending with 24 for D (default). Thus, the magnitude of each credit-rating change is obtained by subtracting the number before from the number after the credit event. We also retain beginning and ending ratings for each credit event because a change of -4, for example, for a firm downgraded from AA to A- may have different CCRD effects than one downgraded from BBB to BB-. We aggregate credit-rating changes on a quarterly basis and measure their costs over two year periods. In the robustness section, we also split the "all" and "HYL" samples into upgrades and downgrades based on the results of our structural distance-to-default model.

To ensure that the CCRD estimates are the result of credit deteriorations and not unduly influenced by other corporate events, we obtain "clean" samples by eliminating rating-change events that have various confounding announcements over the one year period up to and including the credit-rating change event using the CAPITALIQ Events database. Such events are: Dividend increases and decreases (categories 46 and 47, respectively) as in Davydenko, Strebulaev, and Zhao (2012); Stock splits & significant stock dividends (category 53); Special dividends (category 94); M&A transactions and cancellations (categories 80 and 82, respectively); Lawsuits & legal issues (category 25); IPOs (category 85); Earnings (category 28); and Exchange Changes (category 57).

We obtain quarterly corporate financial information associated with cash flows, capital expenditures and total capital for our sample firms from COMPUSTAT (see appendix 5 for a complete listing of the

[25] We use "loan" and "deal" interchangeably throughout the paper.

variables examined herein). Since quarterly EBITDA is not provided in COMPUSTAT, we estimate it using the method in Fabozzi and Markowitz (2002) as sales (SALEQ) less costs of goods sold (COGSQ) less Selling, General and Administrative Expenses (XSGAQ). Industry variables are calculated as the averages for all the firms in the same first two digits SIC code. Daily stock returns and their volatilities, and quarterly and daily weighted-average indexes of NYSE, NASDQ and AMEX stocks are drawn from the CRSP database. Risk-free rates (3 month, 1 year and 5 years) are obtained from the Federal Reserve Data Download Program (DDP) website.

Unlike much of the literature, we calculate the market value of debt using daily corporate bond prices obtained from the TRACE database from 2002.[26] For firm-days without bond prices, we use the price from the closest available day. The annual marginal corporate tax rate for each firm is obtained from John Graham's website (Graham and Mills, 2008).

4.3.2 Descriptive Sample Statistics

The summary descriptive statistics reported in Table 4.1 display major differences between credit-rating upgrades and downgrades depending upon whether the classification is based on S&P rating changes or our model-implied credit events. Based on Panel A of Table 4.1, about one-third of all S&P downgrades occur during the recent 2007-2009 financial crisis and nearly one-half of all S&P upgrades occur during the three-year period 2010-2012. The peak years in terms of relative frequency are 2009 (16.38%) for downgrades and 2011 (17.77%) for upgrades. We observe somewhat similar values for the financially downgraded and upgraded firms with a little less than one-third of all downgrades occurring during the recent 2007-2009 financial crisis and over one-half of all upgrades occurring during the three-year period 2010-2012. However, financial downgrades at nearly one-third of this sample are not only still higher during the most recent three-year period of 2010-2012 but they peak at 14.69% in 2011.

[Please place Table 4.1 about here]

Based on Panel B of Table 4.1, we find quite different patterns for model-implied (point-in-time) upgrades and downgrades. We observe that only about 17% of the market-implied downgrades occur during the recent 2007-2009 financial crisis and over one-half occur during the prior three-year period 2004-2007 with the peak of 34.5% occurring in 2005. In contrast, over 57.2% of the market-implied upgrades occur in the three-year period of 2004-2007 and only 19.5% occur in the three-year period

[26] Davydenko, Strebulaev and Zhao (2012) examine the market value of debt using bond trading data from Merrill Lynch just before and after default. In contrast, we use the market value of debt to capture variations in the value of debt leading up to the period in time just before default.

2007-2009. We observe that only about 16.0% of the market-implied financial downgrades occur during the recent 2007-2009 financial crisis and about 24.1% occur during the prior three-year period 2004-2007 with the peak of about 23.4% occurring in 2012. Similarly, over 39.8% of the market-implied financial upgrades occur in the three-year period of 2004-2007 and only about 21.3% occur in the three-year period 2007-2009. This observation can be attributed either to more subjective assignment of through-the-cycle ratings during the period by S&P, or to a structural shift in the way that S&P analyzed the credit quality of their customers.

Table 4.2 reports the distributions of the number of firms that experience various one-notch down- (up-) grades ending in different credit-rating categories. Panels A and B report the numbers of firms for downgrades and upgrades, respectively. There is a significant concentration of downgrades into the B-rated categories (501 and 847 S&P and model-implied downgrades, respectively, for the all sample in Panel A). Most downgrades (upgrades) are one-notch events, so our results are more skewed towards the one-notch samples, and there is a decreasing trend in downgrade (upgrade) occurrences as the magnitude (number of notches) of credit-rating changes increases. We find that the number of credit-event occurrences is almost twice as large for the HYL versus All samples. This suggests that actual ratings are likely to be of greater materiality because they occur less frequently. It also suggests that credit-rating agencies not only account for more factors than the general quantitative-rating models but use a through-the-cycle perspective when making credit-rating decisions. This is consistent with the findings of Hovakimian, Kayhan, and Titman (2009) that credit-rating agencies have the tendency to assign relatively stable ratings to their clients.

[Please place Table 4.2 about here.]

4.3.3 Measures of Debt and Total Firm Capital

Using the book value of debt as in Andrade and Kaplan (1998) cannot effectively capture the costs that firms incur from a credit event since the effect on bond yields of such an event is quickly reflected in the secondary market. A firm captures these costs mostly at rollover points of its existing debt by incurring higher financing costs (Leland and Toft, 1996; He and Xiong, 2012; Elkamhi, Ericsson, and Parsons, 2012).

We use two methods to estimate the market value of debt. The first method estimates the market value of debt using a structural Merton-like model (Merton, 1974) by simultaneously estimating the value of the firm and its volatility (as is more fully discussed in Appendix 4). This model needs an estimate of a default boundary that refers to the value of the firm when it exogenously decides not to service its debt and consequently defaults. The first method computes this default boundary as short-term debt plus one-

half of long-term debt. Since this method is known to highly underestimate the value of debt, our second method calculates the market value of debt using the price changes of corporate bonds as reported in TRACE. We assume that such changes are good proxies of the changes in the overall value of a firm's total debt. Thus, we calculate the market value of debt by multiplying the book value of debt at the beginning of a quarter by the change in the value of public debt over that quarter. When this market value of debt is added to the firm's total equity value, we obtain a market-value estimate of the firm.

Since public information is no longer available when a firm becomes bankrupt or privatized (as a result of a LBO deal), Kaplan (1989, 1994) and Andrade and Kaplan (1998) are only able to obtain estimates of the costs to value by first multiply a firm's cash flow margins by the ratio of its total capital to cash flows and then increase this value by 3% to account for direct bankruptcy costs. We expect the estimates of Andrade and Kaplan (1998) to be quite noisy since the magnitudes of the fluctuations in cash flow margins may exceed fluctuations in capitalized costs (Asquith, Gertner, and Scharfstein, 1994; Davydenko, Strebulaev, and Zhao, 2012). In contrast, our method should significantly reduce this high-volatility problem since we calculate the total capital of the firm as the sum of total assets in each quarter (ATQ), less total book liabilities (DLTTQ + DLCQ) and total market liabilities. This is possible because all accounting information is still available for publicly traded firms after credit-rating changes prior to bankruptcy.

4.4 DOES THE HIGH- YIELD SAMPLE MESURES THE "FINANCIAL" COST OF CREDIT- RATING CHANGES?

In previous sections, we argued that our sample of firms with high-yield loans (HYL) is a better proxy for the CCRD associated with relatively "pure" financial distress than the LBO sample examined by Andrade and Kaplan (1998) both in terms of its relative pureness and representativeness. In this section, we test this conjecture for our two HYL samples using the methodology of Andrade and Kaplan (1998).

4.4.1 Impact of High-Yield Loan Originations

If financial costs are the primary contributors to credit deteriorations in the HYL sample, we expect that the deterioration in "financial-health" ratios to be larger in this sample. To test this conjecture, we select two important ratios: first, the ratio of the book leverage (book value of total debt to total capital); and second, the interest coverage ratio (EBITDA to Interest Expenses). We measure these ratios in the year before and also during the year of the high-yield loan (HYL) deal. Based on the results summarized in Table 4.3, both of these measures deteriorate for the entire sample at the onset of the HYL loan and the

magnitude of this deterioration varies with the issuer's credit rating. For a typical B-rated firm, the decline in interest coverage ranges between 0.49 and 0.60 from a year before to one year after the HYL deal. The increase in the leverage of the issuers is not homogenous across different credit-rating categories. For example, the median ratio of book leverage for A-rated issuers decreases only slightly from 0.37 in the year prior to the year of the loan to 0.29 in the year of the loan. The corresponding changes in the same ratio for the higher risk categories C (D) is from 0.57 to 0.95 (from 0.79 to 0.99). This highlights the differential impact of high-yield loans on an issuer's capital structure and leverage across different credit-rating categories.

[Please place Table 4.3 about here.]

4.4.2 Contributors to Financial-ratio Costs of Credit-rating Deteriorations (CCRD)

Using a methodology similar to that of Asquith, Gertner, and Scharfstein (1994), we measure the contribution of industry, firm and leverage to the financial-ratio costs of CCRD after a credit event.[27] The industry's contribution to CCRD is estimated by comparing what would have been the change in the interest coverage ratio if the issuer had the same relative performance as its industry median in the year before the deal. The estimate of the effect of issuer performance on CCRD is obtained by using the issuer's cash flows as if it had maintained its pre-loan deal performance post-loan deal. In the final step, we estimate the role of the issuer's leverage by measuring what would have happened if the interest-coverage ratio was equal to the median of this ratio for the issuer's industry.

The estimated contributions of each of these three factors to the CCRD from a downgrade are reported in Table 4.4 for two categories (investment grade or IG and speculative grade or SPEC), the specific credit-rating classes of A, B, C and D, and the undifferentiated sample of credit-rating downgrades (All).[28] Based on the medians, we observe that the contribution is highest for the leverage effect followed successively by the issuer performance effect and a nil industry effect for the SPEC sample, and is highest for the issuer performance effect followed successively by the leverage and industry effects for the IG sample.[29] When we examine the median contributions for the four specific credit-rating categories individually and collectively, we find that the industry effect is most pronounced with little issuer and

[27] Many recent studies use various accounting variables or their ratios to examine the real or operating performance effects of events such the appointment of CEOs as outside directors (Fahlenbrach, Low and Stulz, 2010), private-equity ownership (Acharya et al., 2013), SEO firm overinvestment (Fu, 2010), and short-selling constraints (Grullon, Michenaud and Weston, 2015).

[28] Table 4.4 only includes the results for the HYL sample because we are testing the conjecture that the primary source of CCRD for these HYL issuers is financial. Investment Grade (IG) category includes issuers with bond ratings of BBB or higher, and speculative (SPEC) includes issuers with bond ratings of BB to D, inclusive.

[29] Based on the means, the ordering changes for the IG sample to industry effect, issuer effect and finally leverage effect.

leverage effects for the A-rated deals. In contrast and as expected, the leverage effect followed by the issuer performance effect contributes most to CCRD for the other three credit-rating categories. These findings are consistent with those reported by Asquith, Gertner, and Scharfstein (1994) and Andrade and Kaplan (1998).

[Please place Table 4.4 about here]

4.5 EMPIRICAL RESULTS

4.5.1 Changes in Credit Ratings and Firm Value

In this section, we examine the mean and median changes in the market- and industry-adjusted total capital values (TCV) in millions of dollars associated with credit-rating downgrades and upgrades from a year prior to the change to t = 0 (the year of the change) and to t = 1 (the year after the change). This examination is undertaken for various credit-rating groupings of: IG (investment grade, at least a BBB rating), SPEC (speculative grade, below a BBB rating), and A, B, C and D (default) ratings where A, B and C capture their plus and minus notches.

The market-adjusted changes in TCV ($M\Delta TCV_t$) are obtained by subtracting the market-adjusted measure of total capital at t = 0 (TCV_t) from the total capital for the preceding year (TCV_{-1}), and then dividing this value by (TCV_{-1}). More precisely:

$$\text{Madj}\Delta\text{TCV}_{-1,0} = (TCV_{-1} - \text{Madj}\Delta\text{TCV}_t)/TCV_{-1} \quad (35)$$

where the TCV for each of the years after t=1 are first discounted back to the year prior to the year of the credit-rating change (t = -1) using the quarterly CRSP value-weighted index (Andrade and Kaplan, 1998; Korajczyk and Levy, 2003) of all NYSE, NASDAQ and AMEX listed stocks. The industry-adjusted changes in TCV ($\text{Iadj}\Delta TCV_t$) are obtained using a similar method and the returns of an equally-weighted portfolio of the stocks (Andrade and Kaplan, 1998) in the same two-digit SIC industry category. Specifically:

$$\text{Iadj}\Delta\text{TCV}_{-1,0} = (TCV_{-1} - \text{Iadj}\Delta\text{TCV}_t)/TCV_{-1} \quad (36)$$

The significances of the means and medians are determined using a student t-test and Wilcoxon-Mann-Whitney U test, respectively. Since the distributions of the changes in capital values associated with credit-rating changes diverge from normality, non-parametric tests (such as the Wilcoxon and Wilcoxon-Mann-Whitney U tests) can be considered as being more reliable.

Panels A and B of Table 4.5 report the mean and median changes in the market- and industry-adjusted total capital values (TCV) in millions of dollars associated with credit-rating downgrades and upgrades, respectively, from a year prior to the change to t = 0 (the year of the change) and to t = 1 (the year after the change). The most important result in Panel A of Table 4.5 is the large and highly significant CCRD associated with credit-rating deteriorations for all rating categories during the year of the credit-rating deteriorations (t = 0), which are consistent with the general predictions and findings reported in the literature that rating downgrades negatively affect stock and bond prices (Klinger and Sarig, 2000; Elton *et al.*, 2001). The absolute values of the CCRD generally increase as the credit-rating declines. The first four rows report the CCRD when firms are downgraded into "investment grade" or "speculative" categories. As expected, the median market-adjusted (industry-adjusted) CCRD in the year after a downgrade is a significant -14.8% (-16.7%) when firms are downgraded into a speculative rating, and -7.2% (2.3%) when they are downgraded from a higher to a lower investment grade category.

[Please place Table 4.5 here]

The next eight rows report the CCRD when firms are downgraded into A, B, C and D rating categories. Once again, we observe significantly larger CCRD in absolute value terms for firms that are downgraded into any of these rating categories. For example, the median industry-adjusted CCRD when measured from t=-1 to t=1 becomes monotonically more negative as the credit ratings associated with the downgrades move from A to D. For this finer delineation of credit ratings, we observe that the market-adjusted CCRD of -8.5%, -15.6% and -35.8% for credit-rating categories of B, C and D, respectively, are larger in magnitude than their industry-adjusted counterparts. If found to be subsequently robust, these changes appear to be sufficient to satisfy the hurdle set by Elkamhi, Ericsson, and Parsons (2012) that a relatively continuous annual decline in firm value prior to bankruptcy of only 1% or 2% should be enough to resolve the underleverage puzzle.

The positive and significant (median-only) industry-adjusted CCRD of 4.9% and 3.3% for downgrades within our highest rating category of A for periods [-1:0] and [-1:1] are an obvious exception, which could mean that the downgrades were less than anticipated or were due to an increase in the conservatism of credit-rating agencies during the studied period (Baghaei, Servaez, Yamao, 2013). The right-most four columns report normalized CCRD that are obtained by dividing the respective values by the weighted-average number of notches of downgrades in each category to obtain the normalized cost that a firm incurs, on average, from a one-notch change in its credit rating. We find that in the immediate year after a credit-rating deterioration to or within the speculative and investment grade categories, a median firm incurs a -9.1% and -5.9% cost for each notch, respectively. Thus, normalized costs exhibit the same pattern as the non-normalized costs as a one-notch downgrade to or within a speculative grade is

associated with larger costs than a one-notch downgrade to or within an investment grade category. The same pattern applies for downgrades to or within the A, B, C and D categories.

Panel B of Table 4.5 supports the finding that firms benefit from credit-rating improvements in terms of capitalized benefits. However, these benefits are smaller in absolute values than their counterparts for credit-rating deteriorations. This asymmetric effect is consistent with the findings of Hand *et al.* (1992), Goh and Ederington (1993) and Grier and Katz (1976). Unlike their market-adjusted median counterparts, all of the industry-adjusted median BCRU are at least marginally significant for upgrades to or within the investment (IG) and speculative (SPEC) grade categories. Unlike their market-adjusted mean counterparts for the speculative category, the market-adjusted means of 4.2% and 4.6% for t [-1:0] and [-1:1] for upgrades to or within the investment (IG) category are highly significant. Among upgrades to or within the three investment grade categories, the benefits and their significance decrease with movement from upgrades to or within A to those to or within C. While none of the market-adjusted median BCRU are significant, the industry-adjusted median BCRU are significant for upgrades to or within the A and to or within the B categories. All four of the mean BCRU are significant (and positive) once again only for upgrades to or within the A and to or within the B categories. To illustrate, the mean market-adjusted BCRU for t [-1:0] are a significant 8.7%, and marginally significant 6.4% and an insignificant 2.5% for upgrades to or within the A, B and C categories, respectively. The last two rows report the BCRU not differentiated by final credit-rating category. All of the BCRU are positive with at least marginally significant medians and highly significant means. The median market- and industry-adjusted medians are 5.0% and 9.3% for t [-1:0] and the corresponding means are 4.9% and 18.4%, respectively. As credit ratings improve from C to A both the not normalized and normalized BCRU increase in magnitude. A one-notch improvement in credit rating that ends in the C, B or A category results in market-adjusted BCRU of -2.8%, -1.3%, and 4.5% (2.3%, 4.6% and 6% when industry-adjusted), respectively, one year after the credit upgrade.

Panel C of Table 4.5 reports the CCRD for our HYL sample for the year before entering into the high-yield loan contract (DealYear, t=-1), the year of credit-rating deterioration (t=0) and the year after the credit-rating deterioration (t=1). It also reports the changes in the CCRD from t=-1 to both t=0 and t=1 (i.e., [-1:0] and [-1:1]). If we compare the relative changes in the industry- and market-adjusted CCRD between Panels A and C of Table 4.5, we find that the values reported in Panel C for the HYL sample generally are larger in magnitude, which is consistent with the results reported in Davydenko, Strebulaev, and Zhao (2012). This non-homogeneity across time and rating classes may be due, at least partly, to non-alignment in the timing of the downgrades for these two samples. The results also suggest that downgrade costs are inversely related with credit-rating quality (higher relative CCRD with lower quality).

Panel D of Table 4.5 reports the BCRU for our HYL sample for the year before entering into the high-yield loan deal (DealYear, t=-1), the year of credit-rating deterioration (t=0) and the year after the credit-rating deterioration (t=1). It also reports the changes in the BCRU from t=-1 to both t=0 and t=1 (i.e., [-1:0] and [-1:1]). All but one of the BCRU changes is either insignificant or only marginally significant. In general, the BCRU changes are lower for this HYL sample compared to those reported earlier in Panel B of Table 4.5 for the All sample. Consistent with earlier results for the All sample, the BCRU changes are generally more significant and larger in magnitude for an upgrade to or within the A category in comparison to upgrades to or within the B or C categories, and for an upgrade to or within the investment grade (IG) category compared to an upgrade within the speculative category.

These results help us understand the concern among U.S. CFOs about maintaining the current credit rating. Even if upgrades and downgrades occur with the same probability, the ex-ante costs of a credit-rating change is essentially negative due to the larger magnitudes of the costs associated with a credit-rating downgrade compared to the benefits of a credit-rating upgrade. While Davydenko, Strebulaev, and Zhao (2012) surmise that the empirical results of Andrade and Kaplan (1998) are downward biased because many LBOs have low costs of distress when deciding to become highly leveraged, we find that downgrade costs are higher (but generally less significant) for our HYL sample. We attribute these seemingly contradictory results to different samples. Unlike Davydenko, Strebulaev, and Zhao (2012), we find that firms of low (not high) quality incur the largest costs. We attribute this seemingly contradictory difference to our choice of the *post-migration* credit ratings as the reference points versus their choice of *pre-migration* credit ratings.[30]

5.2 CCRD and BCRU Determinants

We now investigate what are the determinants of the magnitudes of costs (and benefits) of credit-rating deteriorations (and improvements) using a regression model with classic capital structure variables (Parsons and Titman, 2009; Graham and Leary, 2011) and the number of notches of credit-rating (CR) deteriorations or improvements. Specifically:

$$\begin{aligned}(CCRD\ or\ BCRU)_{i,t} = {} & \beta_0 + \beta_1 Notches_{i,t} + \beta_2 MktLev_{i,t} + \beta_3 MtB_{i,t} + \\ & \beta_4 \log(sales)_{i,t} + \beta_5 MtB_{i,t} + \beta_6 CFVol_{i,t} + \beta_7 Profit_{i,t} + \beta_8 Tang_{i,t} + \\ & \beta_9 DivPayer_{i,t} + \beta_{10} TaxRate_{i,t} + \beta_{11} IdioVol_{i,t} + \varepsilon_{i,t}\end{aligned} \quad (37)$$

[30] Longstaff, Mithal, and Neis (2005) report the average default and nondefault components of the yield spread for firms with a given ending credit rating.

where *Notches* is the number of notches by which a firm has been downgraded (upgraded), *MktLev* is market leverage, *MtB* is the market to book value, *Log(Sales)* is the natural logarithm of sales, *Profit* is the profitability ratio, *Tang* is tangibility, *DivPayer* is the dividend payer dummy, *TaxRate* is the corporate tax rate, and *IdioVol* is the idiosyncratic volatility. Construction of these variables is explained in Appendix 5. Equation (37) is estimated for samples of downgraded and upgraded firms whose credit-rating changes are primarily attributed to economic factors (Economic) and to financial factors (Financial). The economic samples consist of sample firms without high-yield loans (HYL) and the financial samples consist of sample firms with high-yield loans.

Based on the results summarized in Table 4.6, we find that the most important determinant is the magnitude of the changes in credit ratings. After two years, a one-notch downgrade is associated with a 6.41% (10.41%) cost to the firm value in the economic (financial) sample. The second highest contributor to CCRD and BCRU is the cash flow volatility with a 9.22% (14.22%) cost to value after two years to the economic (financial) sample. Other important factors are market leverage, tangibility and idiosyncratic volatility. The regression results also confirm the asymmetric effect of credit events on firm value, since equal-notch downgrades are associated with much higher absolute CCRD costs (6.41% to 10.41%) than equal-notch upgrades (2.23% to 5.8%). The finding that the magnitudes of the credit-rating change variable in number of notches stays highly significant after accounting for other firm-specific variables suggests that the CCRD (BCRU) associated with credit-rating changes provide material information about the costs from changes in financial distress in addition to those that occur at bankruptcy or acute financial distress.

[Please place Table 4.6 here]

4.5.2 Changes in Credit Ratings and Firm Return Impacts Based on an Event Study

In this section, we examine the effect of credit-rating deteriorations (improvements) on firm value estimated using a formal event study methodology. We begin by employing a propensity matching strategy (Dehejia and Wahba, 2002) based on a firm's propensity to receive a high yield loan (HYL) to obtain a sample of actual HYL firms (treatment) and a matched control sample (control) that contains firms without HYL acting as the benchmark. One implicit assumption in this method is that assignment to treatment is based only on observable pre-treatment variables. We invoke the *ignorable treatment assumption* (Heckman and Robb, 1985; Holland, 1986; Rubin, 1974; Rubin, 1977; Rubin, 1978) that Dehejia and Wahba (2002) show has only a marginal effect on results. The set of observables used to compute the propensity scores include market leverage, debt maturity, industry market leverage, market

to book ratio, tangibility, profitability, size, cash flow volatility, credit ratings and investment grade dummy. Firms previously sorted based on their DW propensity scores are grouped into strata so that the propensity scores, $p(x)$, of firms in each strata are not significantly different from one another. If significant differences exist in the propensity scores in any of the strata, a finer grid is defined so that new strata are formed to encompass previously not significantly different $p(x)$ estimates (Cameron and Trivedi, 2005). All unmatched firms are removed from further consideration.

We calculate the difference between the changes in the firm values for the treatment and control samples (Campbell et al., 1997). Since observations from different time periods can be matched using the PSM procedure, we limit the control sample in each stratum to those from the same year as the treatment observation to which it is matched. We then compute the control-adjusted value changes or returns (CAR) for each treatment firm for each of the 25 quarters centered on each credit upgrade or downgrade (i.e., event quarters q = 0), their cross-sectional averages (ACAR) and their cumulated ACAR (i.e., CACAR).

Table 4.7 reports the ACAR and CACAR results in the left (right) panel for the downgraded (upgraded) samples. The ACAR and CACAR are reported in the second and third columns, respectively, for the sample of all credit-rating changes, and in the fourth and fifth columns, respectively, for firms with credit-rating changes greater than one notch. Based on the Table 4.7 results for all credit-rating changes (columns 2 and 3 in both panels), we observe an average change in total firm value of -5.5% during a credit deterioration quarter and 3.2% during a credit upgrade quarter (i.e. relative event quarter 0). The negative and positive cumulative benchmark-adjusted (CACAR) reactions to credit-rating deteriorations and upgrades, respectively, continue to increase in absolute magnitude for a number of quarters beyond the credit-event quarters. For example, the CACAR of the treatment firms peak in quarter 7 after credit downgrades and quarter 12 after credit upgrades (-15.1% and 5.8%, respectively). We observe even greater firm-value effects for the samples of downgrades and upgrades that are greater than a one-notch change (columns 4 and 5 in both panels). Specifically, we observe event-quarter changes of -7.5% and 7.2% for samples of more than one notch downgrades and upgrades, respectively. The ACAR (dashed lines) and CACAR (solid lines) for the matched samples of downgrades and upgrades are depicted in the upper and lower panels, respectively, for the at least one-notch samples in Figure 4.1 and for the more than one-notch samples in Figure 4.2.

[Please place Table 4.7 and Figures 4.1 and 4.2 here]

We now study the determinants of the cumulative costs to firm value (CAR) over the first eight quarters after credit rating downgrades (upgrades) for the economically- and financially-driven samples of credit-rating changes. Equation (37) includes determinants derived from the capital structure literature and industry fixed effects. Tests of significance are based on time-clustered robust standard errors. Tables

33 and 9 report the regression results for credit-rating downgrades and upgrades, respectively, in odd numbered columns for all changes and in the even numbered columns for credit-rating changes of more than one notch.

[Please place Tables 4.8 and 4.9 about here]

Based on Table 4.8, the costs associated with credit-rating downgrades are highly related, as expected, with the magnitude (number of notches) of the downgrade. In the primarily financially-driven samples (left panel), a one-notch downgrade is associated with a 6.41% (5.58%) costs to value for the at least (more than) one notch sample. For the primarily economically-driven samples (the right panel), the costs to value from downgrades are smaller. Specifically, a one-notch credit-rating downgrade increases the costs to value by 1.58% (2.92%) in the at least (more than) one notch sample. The costs to value from a one-notch credit-rating downgrade are significantly higher with higher market-to-book ratios and idiosyncratic volatilities for all four samples. The costs to value from a one-notch credit-rating downgrade are lower with greater tangibility and profitability and significant for three of the four samples. The costs to value for these two samples of credit-rating downgrades are not significantly related with the inflation rate or GDP growth.

Based on Table 4.9, the magnitude of the association of credit-rating upgrades with the benefits to value is reduced, and is now confined to the two samples with more than a one-notch upgrade. The value benefits of each notch to the primarily financially- (economically-) driven, multi-notch upgrade sample is a significant 2.89% (0.26%). The benefits to value from a one-notch credit-rating upgrade are significantly higher with higher profitability and higher GDP growth for all four samples. The benefits to value from a one-notch credit-rating upgrade are higher with higher market leverage and Log(Sales), and significant for three of the four samples.

4.6 TESTS OF ROBUSTNESS

4.6.1 Model-driven Credit-rating Changes

If markets fully anticipate and reflect the information contained in credit-rating changes prior to their occurrence, then their announcement should not have any capitalized value effects. To further address this possibility, we measure changes in a firm's credit quality before their actual default. We use a measure of the distance-to-default (DTD) on a quarterly basis using a structural approach similar to Moody's KMV model. Using DTD changes as a proxy for changes in the implied credit quality, we re-estimate the firm value costs (benefits) due to credit-quality deteriorations (improvements). Our general finding is that

changes in DTD have similar directional effects but with lower magnitudes and less statistical significance than changes in S&P credit ratings.

The set up and estimation of the model are explained in detail in Appendix 4. After computing the DTD for all firms in our samples for every quarter from 2002 to 2012, we group firms into 24 categories based on each firm's relative DTD to other firms. Interpreting the changes in each DTD group as a change in a firm's credit quality, we perform the same empirics with the model-generated credit ratings as done previously using the S&P credit ratings. In other words, actual S&P credit-rating deterioration (improvement) events are replaced with model-generated credit-change events.

We then examine the mean and median changes in the market- and industry-adjusted total capital values (TCV) associated with the credit-rating changes implied by our DTD model. We observe that the CCRD and BCRU reported in the four panels of Table 4.10 are generally smaller in magnitude with a lower frequency of being significant than those reported earlier for the S&P credit-rating changes. This is consistent with the findings reported in the literature that ratings have some information content beyond what is known by the market (West, 1973), and that credit-rating agencies (CRAs) are important as information-gathering and processing entities (Millon and Thakor, 1985; Boot, Milbourn, and Schmeits, 2006).

[Please place Table 4.10 here]

When we examine the CCRD for the downgrades to the final destination IG and SPEC categories in Panels A and C of Table 4.10, we observe highly and weakly significant negative market- and industry-adjusted CCRD when measured from the year prior to the implied credit-rating change to the year of the change for both the All (Panel A) and HYL (Panel C) samples. We also observe a significant median market-adjusted (industry-adjusted) CCRD of -23.4% (-14.1%) when measured from the year prior to the implied credit-rating downgrade to the year after the year of the downgrade (Panel C). The strongest results for the implied downgrades ending (or remaining) in the C or Default category are for the All sample as their four median CCRD are negative and at least weakly significant, and in the Default category for the HYL sample where three of the four median CCRD are negative and at least weakly significant.

When we examine the BCRU for the upgrades to the final destination IG and SPEC categories in Panels B and D of Table 4.10, we observe some weakly significant industry-adjusted medians from the year prior to the implied credit-rating change to the year of the change (and also to the year after the year of the change) for both the All (Panel B) and HYL (Panel D) samples. However, the industry-adjusted median BCRU from the year prior to the implied credit-rating change to the year of the change is negative

at -3.4%. The sets of four median (and mean) BCRU are not consistent in sign or significance when the upgrade ends in the A, B or C categories.

4.6.2 Control for Business Risk

We further test the results from the high-yield loan (HYL) sample. This is due to the possibility that firms in this sample may have higher business risk (Aivazian, Booth, and Cleary, 2003; Caglayan and Rashid, 2013). If this is the case, then the HYL results would demonstrate higher costs not due to a higher financial burden but simply due to higher business risk. So we test whether our results are robust when we examine a sub-sample consisting of those HYL firms with low business risk, measured by the standard deviation of its return on investment, as in Aivazian, Booth, and Cleary (2003). For this purpose, we split the HYL sample into the sub-sample of high and low business risk. The split is performed using the relative measure of the business risk variable.

Table 4.11 reports the value cost estimates for a sample of HYL firms downgraded by S&P with relatively high business risk in columns 9 to 12 and relatively low business risk in columns 13 to 16. The last four columns measure the differences between these value costs for the high minus low business risk samples. Table 4.3 suggests that our results are robust to controlling for business risk since the same pattern of costs emerge for both the relatively low and relatively high business risk firms and the differences are only highly significant at the point of default. This pattern is also similar to that for the undifferentiated HYL sample reported earlier in Table 4.5, panel A. The magnitude of costs and their significance levels increase as the credit ratings of the sample decline.

[Please place Table 4.11 here]

4.7 CONCLUSION

Based on a sample of all non-financial firms from COMPUSTAT for the 2002-2012 period, we measured the costs of credit-rating deteriorations (CCRD) and benefits of credit-rating upgrades (BCRU) for samples of firms with mixed "economic" and "financial" credit-rating changes and primarily "financial" credit-rating changes. We document that changes in credit ratings are associated with economically and statistically significant capitalized (value) costs or benefits. Costs and benefits associated with credit-rating changes for our mixed economic/financial (All) sample are asymmetric in that the costs of credit-rating deteriorations are much larger than the benefits of credit-rating improvements and are generally larger and more significant if they are primarily driven by financial factors.

Our findings help to address the shortcomings of other pre-default explanations for the under-leverage puzzle, such as undetermined timing, estimation difficulties, unpredictability and heterogeneity across firms. We contribute to this literature by showing that CCRD is an empirically identifiable and quantifiable measure of pre-default costs that can be measured. It also provides a plausible explanation for the under-leverage puzzle and for why U.S. CFO's consider the maintenance of good and stable credit-ratings to be so important.

Finally, we contribute to the literature concerning the information content of credit ratings. We find that deteriorations (improvements) in the implied credit-ratings from a distance-to-default model result in tangible, but smaller and less significant value changes, compared to those resulting from credit changes by S&P. This is consistent with the conjecture that credit-ratings emanating from credit-rating agencies have unique information content (Boot et al., 2006) and are based on across the cycle and not point-in-time evaluations.

Chapter 5:

Conclusion

In this thesis, we study three aspects of corporate debt and explore their implications for corporate financing decisions. These three aspects include (1) debt-type structures, (2) credit spreads and (3) costs associated with downgrades in credit ratings. In the first study, we explore how the strength of creditor rights across 46 countries influences the structure of different debt types in corporate capital structures. We show that stronger creditor protection leads to more concentrated debt structures. We identify that stronger creditor rights impact debt-type structure concentration by (a) making default costlier for creditors and (b) decreasing monitoring incentives for creditors. To account for possible unobserved cross-country heterogeneities, we introduce a new econometric specification called correlated random effect specification (CRE) that enables us to estimate time-varying (time-invariant) regressors with fixed effects (random effects).

In the second essay, we study credit spreads. Specifically, we investigate how changes in the level of economic policy uncertainty impacts corporate credit spreads. As our main proxy for policy uncertainty, we use the recently introduced index of Baker, Bloom and Davis (2015) and find that there are economically large and statistically significant influences from policy uncertainty on credit spreads. We show that increased policy uncertainty increases both the default probabilities captured by the rise in CDS spreads, and also increases the overall economic risk premium captured by the bond-CDS basis. We show that there are two distinct channels through which policy uncertainty impacts credit spreads. The first channel is the postponement of corporate investments in response to escalated uncertainties and the second is the dependence on government spending.

In the last essay, we show that changes in credit ratings are associated with large costs or benefits to firm value. We are able to disentangle financial from economic costs (benefits) of credit rating deterioration (improvement) by comparing changes in firm value in response to credit rating changes in samples with and without leveraged loans. As result of this study, we document that (a) the financial costs are considerably higher than economic costs and (b) that the costs to the firm value due to rating downgrades are significantly larger than the benefits of credit rating upgrades. Our results contribute to the literature of optimal capital structure by documenting that there are additional costs of debt not so far documented in the literature. These costs can materialize continuously prior to the point of default and have the potential to explain why a large number of firms have leverage ratios below that predicted by the trade-off theory, i.e. the underleverage puzzle (Graham, 2000). Our findings are consistent with those of Ericsson et al. (2012) regarding the necessity of continuous pre-default costs for explaining the

underleverage puzzle.

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Appendixes

APPENDIX 1: DESCRIPTIONS OF VARIABLES AND DATA SOURCES FOR CHAPTER 2

Compustat refers to Compustat Global and Compustat North American databases.

Variable	Description	Source
Book leverage	Book leverage is the total debt (the sum of long term debt and debt in current liabilities) divided by total assets	Compustat
Cash flow volatility	CF Volatility is the Standard deviation over past five years of the normalized operating income, that is operating income divided by total assets	Compustat
Country status (Developed/ Developing)	The measure for developed vs. developing country comes from the World Bank's per capita GNI definition as in Qian and Strahan (2007). In this measure, countries with per capita GNI of more than $12,276 are considered rich and those between $3,976 and $12,275 are considered as middle income. Our dataset does not contain poor countries due to unavailability of information.	World Bank, World Development Indicators
Creditor rights	Creditor rights index is the sum of four distinct dummy variables. The first dummy variable equals one if restrictions are in place in case a debtor needs to file for reorganization. The second dummy becomes one when in the case of reorganization, the secured creditors are able to seize collateral. The third dummy concerns the priority over liquidation proceedings and becomes one if secured lenders are given priority. The fourth dummy concerns the continuation of management activities during the reorganization process. This dummy becomes one if management cannot continue in this scenario.	Djankov et al. (2007)
CR1	The first component of creditor rights concerns whether the consent of creditors is required for firm decisions particularly when the borrowers files for reorganization, or decides on minimum dividend payments.	

CR2	The second component addresses whether secured creditors are able to seize collateral after approval of the reorganization petition.	
CR3	The third component addresses whether secured creditors have priority on liquidation proceeds.	
CR4	This component addresses whether the incumbent manager is replaced by an alternative administrator during the reorganization process.	
Inflation	Inflation, according to the World Bank data definition, is the annual rate of growth of the implicit deflators of the GDP, computed as the GDP in terms of current currency to the GDP in the same local currency in 2003.	World Bank, World Development Indicators
Legal origins	Four different legal origins are considered including English, French, German and Nordic. A dummy variable is assigned to each of these legal origins.	La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1999) and the CIA Factbook (2003).
Log of GDP per cap.	Log of GDP per cap. is the natural logarithm of GDP per capita.	World Bank, World Development Indicators
Log of size	Is the natural logarithm of size, measured by a firm's total book assets (COMPUSTAT Item 6)	Compustat
Market to book	Is the market value of equity + total debt + preferred stock liquidating value less preferred taxes and investment tax credit, all divided by total book assets	Securities Daily, Compustat
Profitability	Is earnings before interest and taxes given by operating income before depreciation divided by total book assets	Compustat
Sovereign ratings	Sovereign rating captures the risk of government default and is interpreted as a general indicator of systematic risk. Fitch rating agency's sovereign rating is used.	Fitch Rating Agency
SP90	Dummy variable that equals one if more than 90% of a firm's structure type is from only one debt type and zero otherwise.	Capital IQ database

Heterogeneity	This measure is a Herfindahl-Hirschman index (HHI) normalized to a measure between 0 and 1. $Specialization_{it} = \frac{SS_{i,t} - \frac{1}{7}}{1 - \frac{1}{7}}$	Capital IQ database
Tangibility	Tangibility is computed as the net property, plant and equipment (PPE) divided by total book assets	Compustat
Robustness Variables		
Culture/ Religion	Religion is used as a proxy for culture similar to Stulz and Williamson (2003). Six distinct religions are recognized, including Atheist, Buddhist, Catholic, Hindu, Muslim and Orthodox. A dummy variable for each of these religions equals one if the majority in a country practice that religion.	Stulz and Williamson (2003); CIA Factbook (2003).
Property rights index	Considers the effectiveness of laws and institutions of a country to maintain and enforce the ownership of private owners of their assets.	Heritage Foundation's database
Bureaucratic quality	Higher bureaucratic quality index indicates that laws cannot be changed easily with the change of political power and hence such well-functioning institutions can act as shock absorbents to power transitions.	International Country Risk Guide (ICRG) database
Contract viability	Measures the risk of unilateral contract cancellations or modifications, as well as confiscation of foreign assets. Higher index levels indicate better contract viability.	International Country Risk Guide (ICRG) database
Corruption	Index between 0 and 6 with 0 showing the highest level of corruption. Increased political corruption has adverse effects on the business and financial environment and increases the risk of foreign investments. This measure implies that power is transferred in other measures than ability and therefore can lead to long term destabilizing consequences. Corruption in our study is an index between 0 and 6 with 0 showing the highest level of corruption.	International Country Risk Guide (ICRG) database
GDP per capita growth	Average yearly rate of growth of per capita GDP	World Bank, World Development Indicators

Law and order	Index between 0 and 10 with 0 showing the lowest levels of law and order in a country. Measure shows the traditional strength of law and order where according to Knack and Keefer (1995), increases in this measure can be interpreted as reliable political institutions, smoother and ordered transition of political power, and a better functioning legal system.	International Country Risk Guide (ICRG) database
Liquid liabilities to GDP	Liquid liabilities, also known as M3, is the sum of currency plus deposits in the country's central bank (M0), plus the value of electronic money and cash deposits in the banking system (M1), plus term deposits and savings, and certificates of deposits and purchase agreements (M2); plus time deposits in foreign currencies, travelers checks, commercial papers and all shares of mutual funds that citizens own. This measure shows an economy's level of financial depth.	World Bank, World Development Indicators
Stocks traded to GDP	Total value of stocks traded in a given year normalized by that year's GDP. This captures the annual liquidity of the stock market.	World Bank, World Development Indicators
Efficiency	Developed by Djankov et al. (2007), this index measures the country-specific efficiency of debt enforcement.	Djankov (2008)
Contract enforcement time, contract enforcement cost	The average of the number of days it takes to enforce a contract and the associated costs of enforcement.	World Bank, World Development Indicators
Depth of credit information index	Indicates the accessibility, reliability and coverage of credit related information in a given country.	World Bank Doing Business database
Strength of legal rights index	This measure captures the extent to which the rights of both lenders and borrowers are preserved by the legal system, and includes eight "collateral law" aspects as well as two "bankruptcy law" aspects.	World Bank Doing Business database
Information Sharing	Information sharing is a dummy variable that equals one if either public or private registries exist in a country and zero otherwise. Public and private registry variables are the percent of firms and adults that are covered by public and private registries, respectively, in every country on an annual basis.	World Bank Doing Business database

Ethno-linguistic fractionalization	This index measures the ethno-linguistic fractionalization for each country, using an updated data and method compared to the traditional index of Atlas, Narodov and Mira (1964).	Alesina, Dewleeschauwer, Easterly, Kurlat and Wacziarg (2003)

APPENDIX 2: THE MEASURE OF FIRM TRANSPARENCY

We briefly describe the logic and method by which we construct the transparency index based on Berger et al. (2006). Denote $\tilde{E}_{j,t}$, $E_{j,t}$ and $E_{I,t}$ as firm j's permanent earnings in every year perceived by investors, firm j's actual reported earnings and average earnings for the relevant industry, respectively. In the first step, we scale these measures by a firm's total book value of assets (AT).

$$\frac{\tilde{E}_{j,t}}{A_{j,t-1}} = \left(\frac{E_{j,t}}{A_{j,t-1}}\right)^{\delta} \left(\frac{E_{I,t}}{A_{I,t-1}}\right)^{1-\delta} \tag{A1}$$

Now, let us denote the log-growth rate of the above variables as $\tilde{e}_{j,t}$, $e_{j,t}$ and $e_{I,t}$. Assuming that a firm's share of assets in the industry stays constant over time, we obtain

$$\tilde{e}_{j,t} = \delta e_{j,t} + (1-\delta) e_{I,t} \tag{A2}$$

An assumption here is that the following relationship holds between firm $r_{j,t}$and industry ($r_{I,t}$) returns

$$r_{j,t} = \tilde{e}_{j,t} = \beta_0 + \beta_1 r_{I,t} + \epsilon^r_{j,t} \tag{A3}$$

A similar relationship can also hold for earnings

$$e_{j,t} = \alpha_0 + \alpha_1 e_{I,t} + \epsilon^e_{j,t} \tag{A4}$$

where $e_{j,t}$ are firm earnings and $e_{I,t}$ are the industry earnings. From A2, A3 and A4, we can write

$$\sigma^2\left(\epsilon^r_j\right) = \delta^2 \sigma^2\left(\epsilon^e_j\right) \tag{A5}$$

And thus

$$\delta = \sigma\left(\epsilon^r_j\right) / \sigma\left(\epsilon^e_j\right) \tag{A6}$$

The method of Bajlum and Larsen (2009) is followed to compute the index. For industry affiliations, we categorize firms into 48 Fama and French industry classes using their SIC codes. Earnings growth rates use quarterly data from Compustat Global Quarterly. If lagged earnings are negative, the growth rate will

not be meaningful and therefore we drop such the observations. We compute the market and industry growth rates in earnings for each of the countries as the value-weighted growth of firms in that market (industry).

APPENDIX 3: DESCRIPTION OF THE VARIABLES FOR CHAPTER 3

- *Amount* is the amount of debt issued from TRACE database.
- *Analyst forecast dispersion for GDP* is obtained from the Survey of Professional Forecasters in the Philadelphia Fed Database;
- *Bond-CDS basis:* Is computed by subtracting Markit CDS spreads from bond credit spreads.
- *Book value of Debt (BVD)* is the Sum of short- and long term debt (Compustat: DLTTQ + DLCQ);
- *Capital intensity:* Is measured as Plant, Property and Equipment (PPE) divided by firm's total assets (AT).
- *Cost-sunkness:* We construct this index following Kessides (1990) using firms PPE, rent and depreciation expenses.*Coupon:* is the coupon amount from TRACE database.
- *CreditSpread:* is the difference between the yield of a corporate bond less the yield of the closest maturity Treasury Bills.
- *Cyclicality:* First, we estimate the correlation between a firm's sales and GNP. Next, we take average in each industry, of the estimated correlations using the first two SIC classification codes. Cyclicality is therefore defined as a dummy that equals one if the time-series average of industry correlations is above the overall correlation mean, and zero otherwise.
- *DummyPutable:* is a dummy variable equal to 1 if the bond is putable (obtained from the FISD database), and zero otherwise;
- *ElectionDummy:* is a dummy variable equal to 1 for every presidential election year and zero otherwise;
- *Liquidity:* is the number of trades for a bond in a given month;
- *Long-term Debt:* to Assets is equal to Total Long-term Debt (Compustat: DLTTQ) divided by Total Assets (Compustat: ATQ);
- *Macro controls:* are Expected GDP, Expected unemployment, Consumer confidence, and expected one year inflation. Except for the *consumer confidence index* which is obtained from University of Michigan database, the three other variables come from the Philadelphia Fed website;
- *Market to Book:* is equal to the Market Value of Equity (MVE) plus the Book Value of Debt plus the value of Preferred Shares (Compustat: BVDP) less Deferred Taxes and Investment Tax Credit (Compustat: TXDITCQ), whose sum is divided by Total assets (Compustat: ATQ);

- *Market value of equity* (*MVE*): is the Number of shares outstanding from Compustat multiplied by the market price of each share at the end of the quarter (Compustat: SHROUT * PRC);
- *MarketLev (Market Leverage):* is equal to the Book value of debt (BVD), divided by the sum of the market value of equity and the book value of debt (Compustat: BVD);
- *OITSales (Operating Income To Sales):* is Operating Income Before Depreciation (Compustat: OIBDPQ) divided by Net Sales/Turnover (Compustat: SALEY);
- *PICDummy (Pretax Interest Coverage Dummy):* is Operating Income after Depreciation plus Total Interest and Related Expense (Compustat: OIADPQ + XINTQ), divided by Total Interest and Related Expense (Compustat: XINTQ). The four interest coverage dummies are as in Blume, Lim, and MacKinlay (1998), which are for interest coverage categories of 0 to 25%, 26% to 50%, 51% to 75% and 76% to 100%;
- *Profitability:* is Operating Income Before Depreciation (Compustat: OIBDPQ) divided by Total Assets (Compustat: ATQ);
- *PUI (Policy Uncertainty Index):* is obtained from the website of Baker, Bloom, and Davis that is available at: http://www.policyuncertainty.com;
- *S&P 500 return* is the return of the S&P 500 index for the month, obtained by compounding the daily returns;
- *S&PRating:* Is the credit rating from S&P credit rating agency.
- *Saleability:* is measured using the method of Kim and Kung (2013), and indicates how easily an industry's assets can be sold to firms in other industries by computing the weighted average of redeployabiliy of each asset.
- *Std. dev. of daily excess returns* is the volatility of each firm's daily stock return over that of the CRSP value-weighted index over the past 180 days;
- *TBill:* is yield of 3 month treasury bills from the Federal Reserve Data Download Program.
- *TermSpread:* is obtained as the difference in the yields of 10- and 2-year treasuries;
- *Total Debt Capitalization* is equal to Total short- and long-term debt (Compustat: DLTTQ + DLCQ)
- *Uncertainty controls:* include the Std. dev. of daily excess returns for each firm (from CRSP), VXO Index (from CBOE indexes in the WRDS database), Firm return volatility, which is computed according to Campbell and Taksler (2003) as the standard deviation of daily excess returns over the preceding 180 days, and analyst forecast dispersion (from Philadelphia Fed database).
- *YearsToMaturity:* is the remaining maturity of bond.

APPENDIX 4: KMV- LIKED DISTANCE TO DEFAULT ESTIMATION

Model Development

Merton's distance to default provides a measure for the probability of default that can be applied to all firms in our samples with the highest possible frequency (quarterly). The idea behind the model is simple in that it assumes that firm value (sum of the equity and debt values) will grow at drift rate μ for *n* periods to determine the next value of the firm. After subtracting the value of the default boundary from this new firm value, we divide by the volatility of the firm value to obtain a z-score value which is generally known as distance to default (DTD). Although the default boundary can be obtained in various ways, we use a measure of the default boundary proposed by Leland (1994) due to its realistic features that firms indeed default below the conventional default boundary. More details on our implementation of the model follow.

According to Merton (1974), a firm's value is assumed to follow an Ito process given by:

$$dV = (\mu - \delta)dt + \sigma_v dW \tag{A4.1}$$

In (A1), V refers to the value of the firm, μ is the drift, and δ is the payout rate (the dividend rate herein). σ_v is the volatility of the firm value and W is a Brownian motion. Since this model assumes that the value of equity V_E and its volatility σ_E are observable, we need to estimate two unobservable variables, value of assets V_A and its volatility σ_A.

The first of our two formulations of the default boundary, which is based on a rule of thumb, is:

$$B = STD + 0.5\ LTD \tag{A4.2}$$

where STD and LTD refer to short-term and long-term debt. The second formulation is the Leland (1994) default boundary, which is obtained using:

$$B = [(1 - \tau)C]/(r + 0.5\ \sigma^2) \tag{A4.3}$$

where C is the coupon, r is the risk-free rate, and τ is the marginal tax rate obtained from John Graham's website. A comparison of the estimates for these two models shows that the Leland model yields a lower default boundary. As expected, firms default in the Leland (1994) model when firm value reaches a default boundary given by between 60% and 70% of the current market value of its debt. In this case, firms actually wait before entering default even if their value goes below the current level of debt because having some volatility makes it logical to wait and operate rather than default instantly.

Since a Leland-type structural model does not account for the heterogeneity of debt, an empirical challenge when using C is that the firm may not pay coupons on all its debts. This tends to underestimate the value of the coupon compared to the total value of the debt. We use the empirical solution to this problem suggested by Elkamhi, Ericsson, and Parsons (2012), which is to multiply the current debt value by the risk-free rate to obtain the coupon which yields a more empirically reliable measure of the dividend rate used herein.

In a Leland-type model, a firm's total capital is the sum of the value of its debt $[V_D(t)]$ and equity $[V_E(t)]$ or:

$$V_A(t) = V_D(t) + V_E(t) \tag{A4.4}$$

where
$$V_E(t) = V_A\, e^{-\delta T} N(d_1) - F\, e^{-rT} N(d_2) - \left(1 - e^{-\delta T}\right) V_A \tag{A4.5}$$

Since the value of debt is the residual value, it is obtained by subtracting V_E from V_A to obtain with the time variable suppressed:

$$V_D = V_A\, N(-d_1) + F\, e^{-rT} N(d_2) \tag{A4.6}$$

where N(.) is the cumulative standard normal distribution function and d_1 and d_2 are obtained from:

$$d_1 = \frac{\ln\left(\frac{V_A}{V_B}\right) + \left(r - \delta + \left(\frac{\sigma_V^2}{2}\right)\right) T}{\sigma_v \sqrt{T}} \; and \; d_2 = \frac{\ln\left(\frac{V_A}{V_B}\right) + \left(r - \delta - \left(\frac{\sigma_V^2}{2}\right)\right) T}{\sigma_v \sqrt{T}} \tag{A4.7}$$

To estimate the unobservable V_A and σ_A, we set up a system of simultaneous equations whose solution is found numerically using the Newton optimization technique for a maximum of 50 iterations at each point, or until the absolute value of the difference between the two adjacent estimated σ_V falls to below 0.001. More formally, the system is:

$$\begin{gathered} E = V_A\, e^{-\delta T} N(d_1) - F\, e^{-rT} N(d_2) + \left(1 - e^{-\delta T}\right) V_A \\ \sigma_E = \sigma_V \left(e^{-\delta T}\right) \frac{V_A}{V_E}\, N(d_1) \end{gathered} \tag{A4.8}$$

where the initial value of V_A is V_E and the initial value for σ_V is obtained by:

$$\sigma_V = \sigma_E\, (V_E / (V_E + V_D)) \tag{A4.9}$$

To calculate the distance to default, we assume that μ is the firm's rate of growth. This drift is estimated empirically by considering changes in firm value and dividend payments over the interval of interest:

$$\mu(t) = \max\left\{ \frac{\left(V(t) + Dividend - V(t-1)\right)}{V(t-1)}, r \right\} \tag{A4.10}$$

Thus, we now have all the variables to estimate the distance to default using:

$$DTD = (V_A - B)/(V_A\,\sigma_A) = \left(\ln\left(\frac{V_A}{V_B}\right) + \left(\mu - \delta - \frac{\sigma_A^2}{2}\right)T\right)/\left(\sigma_A\sqrt{T}\right) \quad \text{(A4.11)}$$

A.2 Estimates of Distance to Default

Summary statistics for our distance to default (DTD) estimates grouped into quintiles are reported in Table A4.1. We observe that the value of debt increases as the DTD deteriorates, and the ratio of the market value of debt to total capital increases from 8% to above 133%. This is mostly due to the negative "estimated" market values from the Merton model, when equity volatility and leverage is extremely high, and return falls negative. Asset volatility and equity volatility are also increasing and average stock returns become negative in the lowest DTD sample. As this sample does not exclude defaulted firms, some of the firms in the Max category are actually defaulted firms.

Table B.1. Summary statistics for the quintiles of the inputs to the distance-to-default (DTD) estimates

This table reports the summary distributional statistics for the inputs into the DTD estimations for quintiles over the period from 2002 to 2012. FVD is the face value of debt in each quarter, which is obtained by adding short-term debt (STD) and half of the long-term debt (LTD). V_E is the market value of equity obtained by multiplying number of common shares outstanding by the closing market price in each quarter obtained from COMPUSTAT Quarterly database. V_A is the estimated total value of the firm obtained from the DTD model. MVD/Value is the ratio of the market value of debt to the total value of the firm. The market value of debt is estimated by multiplying the bond-price changes in each quarter for bonds included in the TRACE database by the total value of debt at the beginning of each quarter. σ_v is the asset volatility, which is obtained using the DTD's simultaneous estimation of V_A and σ_v given V_E and σ_e(volatility of firm's equity based on daily CRSP prices over a year prior to the price observation). The Newton Iteration method is used until the difference between two adjacent σ_v falls below 0.001. *Stock Return* is the return of the firm's equity in each period (quarter) as drawn from the COMPUSTAT database.

Variable	***Mean***	***STD***	***Min***	***0.25***	***Median***	***0.75***	***Max***
FVD	21451.02	116132.8	30705.61	22030.15	15554.1	20628.26	65173.04
V_E	11070.71	27142.36	45383.37	19492.82	8369.9	4744.75	8479.36
V_A	22295.94	89863.42	71424.84	38035.43	17065.5	12260.56	19881.88
$MVD/Value$	0.356977	2.973138	0.082529	0.100348	0.180287	0.836759	1.339733
σ_V	0.609743	15.00024	0.135176	0.164429	0.289604	0.705876	4.58991
σ_e	0.790126	14.99721	0.285019	0.302854	0.506586	0.841355	4.76486
$Stock\ Return$	0.008319	0.15302	0.006553	0.017722	0.011618	-0.00685	-0.0077

APPENDIX 5: DESCRIPTION OF THE VARIABLES FOR CHAPTER 4

- *Book leverage:* is the total book value of debt (Compustat: DLTTQ + DLCQ) divided by total assets (Compustat: ATQ).
- *Cash flow volatility* (CFVolatility) is defined as in Kryzanowski and Mohsni (2013) as the volatility of $CF_{i,t} = E_{i,t} - A_{i,t}$ over the past six years where $E_{i,t}$ is Income before extraordinary items (Compustat item #18), $A_{i,t}$ is the change in working capital (or ΔWC) minus Depreciation and Amortization (Compustat item #14).
- *Daily stock returns:* is the weighted-average index of NYSE, NASDQ and AMEX stocks from CRSP database.
- *EBITDA (quarterly):* is sales (SALEQ) less costs of goods sold (COGSQ) less Selling, General and Administrative Expenses (XSGAQ).
- *High-yield loans:* are loans with interest rates of over 200 bps above the Libor rate; the interest paid on the loan is the variable AllInDrawn in DEALSCAN database.
- *Industry market-leverage:* is the average market leverage in any given industry consisting of firms with the same first two digits of their SIC codes.
- *Investment Grade:* is a dummy that equals one if a firm has a rating of BBB+ or better, and zero otherwise.
- *Magnitude of credit rating change:* is the number of notches a firm is downgraded or upgraded due to a credit event by a credit rating agency.
- *Market leverage:* is the value of market debt (explained in this appendix), divided by total assets ("Compustat item: ATQ" less total debt "Compustat: DLTTQ + DLCQ" plus "market value of debt").
- *Market to Book* (*MtB*) is defined as (market equity + total debt + preferred stock liquidating value (Compustat item #10) – deferred taxes and investment tax credits (Compustat item #35)) / book assets.
- *Market value of debt:* is the (total debt at the beginning of the period) times (one plus the change in the bond price during the period from TRACE).
- *Maturity*: for firm *i* at time *t* is defined as the ratio of long term debt to the total debt, according to Fan et al. (2012). The longest maturity index is obtained when all debt is long term, and vice versa. Mathematically: $\text{Maturity}_{i,t} = \left(\text{LongtermDebt}_{i,t}/\text{TotalDebt}_{i,t}\right)$
- *Profitability* (*Profit*) is defined as earnings before interest and taxes given by operating income before depreciation (Compustat item #13), divided by the book value of assets.
- *Rating*: is the actual S&P rating for the long-term bond (Compustat rating item: SPLTICRM).
- *Size*: is the logarithm of a firm's total assets (Assets, Total, Compustat item: ATQ).
- *Tangibility*: is defined as net *PPE* divided by book assets, where *PPE* is Property, Plant, and Equipment (Compustat item #8).
- *Total assets*: ("Compustat item: ATQ" less total debt "Compustat: DLTTQ + DLCQ" plus "market value of debt").

Tables

Table 2.1. Summary statistics for the two debt-type heterogeneity measures and possible determinants

This table reports the summary statistics (mean, median, standard deviation, minimum, maximum, 5th and 95th percentiles) for the two measures of debt-type heterogeneity and their possible determinants for all firms across all our sample countries. Heterogeneity is a measure between 0 and 1 with 1 indicating the highest heterogeneity level. SP90 is a dummy that equals one if a debt type constitutes more than 90% of a firm's debt structure and zero otherwise. The creditor rights index is a measure between 0 and 4 with 4 indicating the strongest creditor rights status. Private and public registries show the total number of these institutions divided by the number of adults in a country. Profitability is earnings before interest and taxes (EBIT) divided by total book assets. Tangibility is net property, plant and equipment divided by total book assets. Cash flow volatility is the standard deviation over the past five years of operating income divided by total assets. A more detailed description of the variables and their construction is provided in Appendix 1. The sample size is 138,801.

Variable	Mean	Median	Min	Max	Percentile 5th	Percentile 95th	Std dev.
Heterogeneity	0.71	0.72	0.09	1.00	0.30	1.00	0.26
SP90	0.45	0.00	0.00	1.00	0.00	1.00	0.50
Creditor rights index	1.94	2.00	0.00	4.00	1.00	4.00	0.94
Log of GDP per cap.	9.83	10.56	6.09	11.51	7.05	10.87	1.28
Inflation	2.87	2.65	-1.35	26.24	-0.70	8.86	2.71
Sovereign rating	3.84	2.00	1.00	16.00	1.00	10.50	3.53
law and order	4.70	5.00	1.00	6.00	2.50	6.00	0.93
Log of size	5.47	5.41	-1.67	11.94	2.18	8.99	2.06
Market to book ratio	1.03	0.64	-0.83	124.26	0.04	2.79	2.98
Profitability	0.07	0.09	-2.58	2.00	-0.17	0.25	0.19
Tangibility	0.33	0.29	-0.07	1.00	0.02	0.79	0.24
Cash flow volatility	0.06	0.03	0.00	2.13	0.00	0.20	0.11
Book leverage	0.25	0.22	-0.05	0.85	0.01	0.59	0.18
Maturity	0.53	0.58	-0.40	1.51	0.00	1.00	0.35

Table 2.2. Country-specific variables

This table summarizes the main features of interest for each country in our sample. The columns report the number of firms (N. of firms); number of firm-year observation (N. of firm-years); average portion (decimal) of each of the seven debt types in each country; the average debt-type heterogeneity (*Heterogeneity*) and single debt type Heterogeneity (*SP90*) index values; creditor rights (CR) index; log of GDP per capita; inflation; sovereign ratings from Fitch agency (Sovereign ratings); developed country dummy according to the level of GNI per capita using the World Bank definition; number of public and private registries per adult population; and information (Info.) sharing dummy, which equals one if either public or private registries exist.

Country	N. of firms	No of firm-years	Comm. paper	Capital lease	Notes	Term loan	Line of credit	Trust	Other debt	Hetero-geneity	SP90	CR	Log GDP per cap	Inflation	Sovereign ratings	Developed country	Public registry	Private registry	Info. sharing
Argentina	64	476	0.00	0.02	0.67	0.31	0.00	0.00	0.00	0.82	0.64	1	9.07	N/A	23.26	0	28.61	96.89	1.00
Australia	1362	6534	0.00	0.43	0.36	0.14	0.07	0.00	0.00	0.77	0.56	3	10.65	2.82	1.81	1	0.00	99.47	1.00
Austria	78	543	0.00	0.07	0.65	0.27	0.01	0.00	0.00	0.67	0.39	3	10.66	2.07	1.00	1	1.32	42.11	1.00
Belgium	115	795	0.00	0.21	0.71	0.02	0.06	0.00	0.00	0.70	0.45	2	10.61	2.29	2.36	1	58.10	0.00	1.00
Brazil	288	1573	0.00	0.22	0.50	0.27	0.02	0.00	0.00	0.66	0.37	1	9.05	5.57	10.41	0	21.77	53.90	1.00
Canada	1569	7002	0.00	0.44	0.34	0.19	0.02	0.00	0.00	0.69	0.43	1	10.63	1.97	1.09	1	0.00	100.00	1.00
Chile	133	894	0.00	0.01	0.52	0.46	0.01	0.00	0.00	0.70	0.42	2	9.16	2.57	6.02	1	29.73	26.59	1.00
China	2102	9957	0.00	0.07	0.83	0.09	0.01	0.00	0.00	0.82	0.63	2	8.30	3.46	5.10	0	13.83	0.00	1.00
Colombia	30	139	0.00	0.00	0.58	0.02	0.40	0.00	0.00	0.66	0.39	0	8.57	4.32	10.88	0	0.00	52.51	1.00
Croatia	28	128	0.00	0.05	0.92	0.02	0.00	0.00	0.00	0.81	0.65	3	9.48	2.83	10.00	1	0.00	63.21	0.00
Denmark	131	819	0.00	0.37	0.56	0.03	0.03	0.00	0.00	0.78	0.57	3	10.87	2.09	1.00	1	0.00	7.55	1.00
Finland	128	985	0.00	0.02	0.89	0.07	0.03	0.00	0.00	0.70	0.50	1	10.66	1.80	1.00	1	0.00	15.51	1.00
France	694	4601	0.00	0.10	0.77	0.08	0.05	0.00	0.00	0.68	0.42	0	10.54	1.75	1.00	1	21.04	0.00	1.00
Germany	684	4271	0.00	0.06	0.72	0.17	0.05	0.00	0.00	0.78	0.58	3	10.55	1.63	1.00	1	0.77	95.24	1.00
Greece	219	1227	0.00	0.03	0.70	0.26	0.02	0.00	0.00	0.71	0.47	1	10.14	3.11	9.23	1	0.00	44.13	1.00
Hungary	22	124	0.00	0.04	0.77	0.00	0.18	0.00	0.00	0.83	0.70	1	9.36	5.12	8.50	1	0.00	8.26	1.00
India	1979	9423	0.00	0.21	0.66	0.13	0.00	0.00	0.00	0.65	0.32	2	7.03	8.46	10.16	0	0.00	8.90	0.00
Indonesia	274	1415	0.00	0.14	0.77	0.07	0.02	0.00	0.00	0.65	0.34	2	7.71	6.72	11.92	0	19.56	0.05	1.00
Ireland	94	516	0.00	0.38	0.27	0.27	0.08	0.00	0.00	0.73	0.50	1	10.81	1.90	3.14	1	0.00	100.00	1.00
Italy	266	1946	0.00	0.18	0.46	0.29	0.07	0.00	0.00	0.69	0.44	2	10.43	2.20	3.87	1	12.27	73.70	1.00
Japan	3190	18718	0.00	0.12	0.78	0.09	0.01	0.00	0.00	0.76	0.55	2	10.59	-0.12	3.25	1	0.00	74.20	1.00
Kenya	24	104	0.02	0.12	0.71	0.15	0.00	0.00	0.00	0.75	0.53	4	6.61	11.44	14.00	0	0.00	2.13	1.00
Malaysia	925	6471	0.01	0.27	0.41	0.28	0.03	0.00	0.00	0.62	0.31	3	8.87	2.42	7.32	1	45.86	32.07	1.00

Mexico	102	704	0.00	0.10	0.59	0.29	0.01	0.00	0.00	0.68	0.40	0	9.05	4.28	9.04	1	0.00	67.63	1.00
Morocco	46	150	0.00	0.34	0.49	0.16	0.00	0.00	0.00	0.76	0.57	1	7.83	1.66	10.00	0	1.04	5.93	1.00
Netherland	170	1065	0.00	0.16	0.24	0.56	0.04	0.00	0.00	0.65	0.38	3	10.68	1.75	1.00	1	0.00	79.00	1.00
New Zealand	116	711	0.01	0.32	0.56	0.11	0.01	0.00	0.00	0.79	0.61	4	10.31	2.65	2.21	1	0.00	0.00	99.26
Norway	233	1190	0.00	0.06	0.62	0.29	0.03	0.00	0.00	0.69	0.42	2	11.28	1.86	1.00	1	0.00	100.00	1.00
Pakistan	221	1142	0.00	0.32	0.56	0.11	0.01	0.00	0.00	0.66	0.36	1	6.88	11.48	N/A	0	4.19	1.37	1.00
Panama	3	16	0.00	0.36	0.15	0.49	0.00	0.00	0.00	0.68	0.44	4	8.83	3.63	10.06	1	0.00	44.40	1.00
Peru	78	457	0.00	0.08	0.80	0.05	0.07	0.00	0.00	0.64	0.35	0	8.32	2.95	10.40	0	22.08	31.89	1.00
Philippine	144	882	0.00	0.04	0.75	0.20	0.01	0.00	0.00	0.79	0.60	1	7.43	4.61	11.78	0	0.00	5.66	1.00
Poland	377	1814	0.00	0.32	0.57	0.04	0.07	0.00	0.00	0.71	0.46	1	9.37	3.32	7.14	1	0.00	61.96	1.00
Portugal	53	391	0.16	0.08	0.34	0.40	0.02	0.00	0.00	0.51	0.21	1	9.91	2.31	4.47	1	72.39	13.05	1.00
Romania	25	71	0.00	0.65	0.32	0.01	0.01	0.00	0.00	0.70	0.44	2	9.04	6.00	10.15	1	6.76	24.29	1.00
Singapore	662	4330	0.00	0.29	0.63	0.04	0.04	0.00	0.00	0.70	0.43	3	10.55	2.65	1.00	1	0.00	44.76	1.00
South Africa	280	1682	0.00	0.31	0.54	0.06	0.09	0.00	0.00	0.68	0.41	3	8.66	6.18	8.21	0	0.00	0.00	57.18
Spain	129	959	0.00	0.14	0.79	0.05	0.02	0.00	0.00	0.70	0.44	2	10.26	2.66	1.99	1	46.56	8.33	1.00
Sri Lanka	170	722	0.01	0.20	0.71	0.05	0.03	0.00	0.00	0.61	0.30	2	7.72	8.21	13.48	0	0.00	0.00	14.36
Sweden	395	2109	0.00	0.33	0.59	0.05	0.03	0.00	0.00	0.69	0.42	1	10.76	1.47	1.08	1	0.00	99.81	1.00
Switzerland	216	1532	0.00	0.19	0.60	0.08	0.13	0.00	0.00	0.71	0.47	1	11.03	0.68	1.00	1	0.00	23.67	1.00
Thailand	438	3038	0.00	0.09	0.46	0.35	0.09	0.00	0.00	0.72	0.47	2	8.23	3.10	8.59	0	0.00	28.55	1.00
Turkey	141	722	0.00	0.05	0.77	0.01	0.17	0.00	0.00	0.91	0.83	2	9.14	8.56	12.11	1	12.07	34.97	1.00
United King	1692	8402	0.09	0.16	0.40	0.25	0.10	0.00	0.00	0.72	0.47	4	10.57	2.58	1.00	1	0.00	0.00	89.66
United States	5587	27990	0.00	0.34	0.27	0.37	0.01	0.00	0.00	0.66	0.37	1	10.74	2.51	1.00	1	0.00	0.00	100.00
Zimbabwe	23	61	0.00	0.15	0.85	0.00	0.00	0.00	0.00	0.81	0.66	4	6.40	3.37	N/A	0	0.00	1.87	0.00
Sum	25700	138801																	

Table 2.3. Correlations

This table reports the Pearson correlations between the variables (dependent and main regressors). *Heterogeneity* is a measure between 0 and 1 with 1 indicating the maximum Heterogeneity. *SP90* is a dummy variable that equals one if more than 90% of a firm's debt consists of one debt type. Log GDP per cap. is the natural logarithm of per capita annual GDP. Inflation is the annual change in the CPI from the World Bank database. Sovereign rating is an annualized numerical equivalent for the Fitch sovereign rating. Public and private registry variables count the number of such credit registries in any given country per number of adults in the population. Information sharing is a dummy variable that equals one if a country has either public or private registries. Log of size is the natural logarithm of total book assets. Market to book is market value of equity divided by total book value of assets. Profitability is earnings before interest and taxes (EBIT) divided by total book assets. Tangibility is net property, plant and equipment divided by total book assets. Cash flow volatility is the standard deviation over past five years of operating income divided by total assets. Book leverage is the sum of short and long term debt divided by total assets. Asterisks signify 0.01 percent significance levels. More detailed variable descriptions of the variables and their construction are available in Appendix 1.

	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Heterogeneity	1												
2 SP90	0.89*	1											
3 Creditor rights	0.06*	0.05*	1										
4 Log of GDP per cap.	0.02*	0.03*	-0.1*	1									
5 Inflation	-0.06*	-0.06*	0.04*	-0.62*	1								
6 Sovereign rating	-0.02*	-0.02*	0.06*	-0.89*	0.56*	1							
7 law and order	0.02*	0.02*	0.07*	0.72*	-0.44*	-0.81*	1						
8 Log of size	-0.16*	-0.14*	-0.14*	0.12*	-0.13*	-0.1*	0.01*	1					
9 Market to book	0.05*	0.04*	0.08*	-0.12*	0.08*	0.13*	-0.1*	-0.07*	1				
10 Profitability	-0.08*	-0.07*	0.01*	-0.11*	0.06*	0.12*	-0.1*	0.34*	-0.01	1			
11 Tangibility	-0.05*	-0.05*	-0.05*	-0.11*	0.06*	0.11*	-0.07*	0.13*	-0.01	0.08*	1		
12 Cash flow volatility	0.06*	0.05*	0.00	0.08*	0.01*	-0.1*	0.09*	-0.33*	0.04*	-0.43*	-0.08*	1	
13 Book leverage	-0.2*	-0.18*	-0.06*	-0.09*	0.09*	0.07*	-0.05*	0.13*	0.00	-0.05*	0.24*	-0.04*	1
14 Maturity	-0.14*	-0.13*	-0.15*	0.17*	0.01*	-0.16*	0.15*	0.30*	-0.05*	0.13*	0.19*	-0.08*	0.22*

Table 2.4. Effect of creditor rights on debt-type heterogeneity: Pooled OLS and random-effects regressions

This table reports summary results for the HHI debt-type Heterogeneity index in columns (1) – (3) for a pooled OLS regression specification and in columns (4) – (6) for a random-effects specification. *, **, and *** indicate significance at the 5, 1 and 0.1 percent levels, respectively. Numbers in parentheses are student t statistics using standard errors clustered at the firm level and using year dummies. The explanatory variables are as defined in Appendix 1.

	(1)	(2)	(3)	(4)	(5)	(6)
Creditor rights	-0.06***	-0.02***	-0.06***	-0.05***	-0.03***	-0.06***
	(-9.38)	(-3.91)	(-10.03)	(-9.29)	(-5.23)	(-11.11)
Log Size		0.10***	0.17***		0.11***	0.17***
		(16.05)	(26.72)		(19.04)	(27.95)
Market to book		-0.03***	-0.01**		-0.02***	-0.01***
		(-8.32)	(-3.20)		(-5.53)	(-3.40)
Profitability		0.04***	0.02***		0.02***	0.02***
		(9.28)	(6.10)		(7.32)	(5.73)
Book leverage		0.17***	0.16***		0.13***	0.13***
		(32.80)	(32.25)		(29.30)	(28.30)
Maturity		0.07***	0.01*		0.03***	0.00
		(14.62)	(2.24)		(6.69)	(1.11)
Law and order			-0.02*			0.06***
			(-2.03)			(5.92)
Log of GDP per cap.			-0.13***			-0.14***
			(-6.96)			(-8.46)
Inflation			-0.02***			-0.03***
			(-3.68)			(-5.09)
Sovereign ratings			0.03			0.04***
			(1.74)			(3.37)
Developed country			0.32***			0.21***
			(10.90)			(8.58)
English legal origin			0.05			0.11***
			(1.37)			(3.75)
French legal origin			-0.27***			-0.13**
			(-5.90)			(-3.10)
German legal origin			-0.44***			-0.40***
			(-12.59)			(-12.67)
Constant	-0.61***	0.12	-0.05	0.00	0.01	-0.36***
	(-3.69)	(0.00)	(-0.00)	(0.08)	(0.26)	(-4.76)
Observations	138801	138801	138801	138801	138801	138801
Adjusted R^2	0.019	0.075	0.114			
Within R^2				0.01	0.01	0.01
Between R^2				0.03	0.12	0.16
Overall R^2				0.02	0.07	0.11
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 2.5. Effect of creditor rights on debt-type heterogeneity: Correlated random-effects regression results

This table reports summary results for the HHI debt-type Heterogeneity index for a correlated random effects (CRE) specification. *, **, and *** indicate significance at the 5, 1 and 0.1 percent levels, respectively. Numbers in parentheses are student t statistics using standard errors clustered at the firm level and using year dummies. Within, between, overall and pseudo r-square values are reported in the last rows of the table. The explanatory variables are defined in Appendix 1.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Creditor rights	-0.05***	-0.02**	-0.06***				
	(-9.29)	(-3.21)	(-9.97)				
CR1				-0.12***			
				(-8.15)			
CR2					-0.12***		
					(-8.48)		
CR3						-0.22***	
						(-7.98)	
CR4							-0.03*
							(-2.40)
Log Size		0.17***	0.18***	0.18***	0.18***	0.18***	0.18***
		(9.51)	(9.83)	(9.97)	(9.75)	(9.83)	(9.68)
Market to book		-0.01**	-0.01**	-0.01**	-0.01*	-0.01**	-0.01**
		(-2.87)	(-2.61)	(-2.64)	(-2.55)	(-2.58)	(-2.60)
Profitability		0.01*	0.01*	0.01*	0.01*	0.01*	0.01*
		(2.30)	(2.25)	(2.21)	(2.27)	(2.23)	(2.29)
Book leverage		0.09***	0.09***	0.09***	0.09***	0.09***	0.09***
		(14.15)	(14.28)	(14.24)	(14.27)	(14.25)	(14.27)
Maturity		0.00	0.00	0.00	0.00	0.00	0.00
		(0.16)	(0.02)	(0.04)	(0.03)	(0.05)	(0.04)
Law and order			0.05***	0.05***	0.05***	0.05***	0.04***
			(5.42)	(4.62)	(5.17)	(4.74)	(4.30)
Log of GDP per cap.			-0.13***	-0.18***	-0.13***	-0.15***	-0.12***
			(-8.26)	(-10.12)	(-8.00)	(-8.97)	(-7.28)
Inflation			-0.03***	-0.02***	-0.03***	-0.03***	-0.03***
			(-5.23)	(-4.48)	(-5.21)	(-5.58)	(-5.08)
Sovereign ratings			0.04**	0.01	0.03**	0.00	0.03
			(2.92)	(0.91)	(2.58)	(0.05)	(1.90)
Developed country			0.21***	0.20***	0.23***	0.19***	0.20***
			(8.61)	(8.32)	(9.38)	(7.59)	(8.26)
English legal origin			0.11***	0.07*	0.12***	0.09**	0.10**
			(3.82)	(2.29)	(3.99)	(3.12)	(3.18)
French legal origin			-0.11**	-0.16***	-0.03	-0.17***	-0.07
			(-2.62)	(-3.73)	(-0.71)	(-3.86)	(-1.69)
German legal origin			-0.37***	-0.40***	-0.39***	-0.37***	-0.36***
			(-11.72)	(-12.35)	(-12.33)	(-11.71)	(-11.15)
Constant	0.00	0.02	-0.35***	-0.20**	-0.33***	-0.07	-0.27***
	(0.08)	(0.43)	(-4.55)	(-2.70)	(-4.30)	(-0.84)	(-3.61)
Observations	138801	138801	138801	138801	138801	138801	138801
Within R^2	0.01	0.01	0.02	0.01	0.01	0.01	0.01
Between R^2	0.03	0.12	0.18	0.17	0.17	0.16	0.17
Overall R^2	0.02	0.07	0.11	0.11	0.11	0.11	0.11
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 2.6. Alternative dependent variable

This table reports results for the an alternative debt-type heterogeneity index, called SP90, which is a binary variable that equals one if 90% of a firm's debt structure consists of only one debt type. Since this dependent variable is binary, we use a Probit specification with industry and year effects. *, **, and *** indicate significance at the 5, 1 and 0.1 percent levels, respectively. Numbers in parentheses are student t statistics using standard errors clustered at the firm level and using year dummies. Within, between, overall and pseudo r-square values are reported in the last rows of the table. The explanatory variables are defined in Appendix 1.

	(1) SP90	(2) SP90	(3) SP90	(4) SP90	(5) SP90	(6) SP90	(7) SP90
Creditor rights	0.09***	0.03*	0.10***				
	(8.12)	(2.27)	(8.89)				
CR1				0.25***			
				(7.93)			
CR2					0.22***		
					(7.51)		
CR3						0.41***	
						(7.11)	
CR4							0.04
							(1.55)
Log Size		-0.31***	-0.32***	-0.33***	-0.32***	-0.32***	-0.32***
		(-8.35)	(-8.69)	(-8.83)	(-8.62)	(-8.69)	(-8.55)
Market to book		0.01	0.01	0.01	0.01	0.01	0.01
		(1.64)	(1.37)	(1.40)	(1.30)	(1.36)	(1.35)
Profitability		-0.02*	-0.02	-0.02	-0.02	-0.02	-0.02*
		(-1.98)	(-1.93)	(-1.89)	(-1.95)	(-1.92)	(-1.97)
Book leverage		-0.16***	-0.16***	-0.16***	-0.16***	-0.16***	-0.16***
		(-12.63)	(-12.72)	(-12.68)	(-12.71)	(-12.70)	(-12.71)
Maturity		-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
		(-1.24)	(-1.16)	(-1.17)	(-1.16)	(-1.18)	(-1.17)
Law and order			-0.10***	-0.08***	-0.09***	-0.08***	-0.07***
			(-4.65)	(-3.98)	(-4.39)	(-3.97)	(-3.53)
Log of GDP per cap.			0.31***	0.40***	0.30***	0.33***	0.29***
			(8.85)	(10.66)	(8.69)	(9.47)	(8.05)
Inflation			0.03**	0.03*	0.03**	0.04***	0.03**
			(3.10)	(2.37)	(3.07)	(3.50)	(2.92)
Sovereign ratings			-0.05	0.00	-0.04	0.02	-0.02
			(-1.78)	(0.08)	(-1.45)	(0.75)	(-0.76)
Developed country			-0.44***	-0.43***	-0.49***	-0.39***	-0.43***
			(-8.52)	(-8.34)	(-9.24)	(-7.57)	(-8.23)
English legal origin			-0.17**	-0.08	-0.18**	-0.13*	-0.13*
			(-2.68)	(-1.26)	(-2.81)	(-2.02)	(-2.00)
French legal origin			0.31***	0.42***	0.16	0.42***	0.24**
			(3.56)	(4.65)	(1.88)	(4.63)	(2.78)
German legal origin			0.74***	0.79***	0.78***	0.75***	0.72***
			(11.16)	(11.74)	(11.68)	(11.18)	(10.74)
Constant	-0.20	-0.26*	0.41*	0.14	0.37*	-0.12	0.26
	(-1.76)	(-2.29)	(2.51)	(0.84)	(2.29)	(-0.72)	(1.59)
Observations	138801	138801	138801	138801	138801	138801	138801
Pseudo R^2	0.01	0.04	0.07	0.06	0.06	0.05	0.04
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 2.7. Additional institutional controls

This table reports CRE regression results for the relation between creditor rights and debt-type heterogeneity with additional country-level variables as controls. The institutional variables of interest here are mostly concerned with the strength and quality of property rights in each country. Due to the correlation between these additional variables, they are included separately in columns (2) through (11) and together in column (1). All regressions include standard errors clustered at the firm-level and year dummies. *, **, and *** indicate significance at 5, 1 and 0.1 percent levels, respectively. Descriptions of the explanatory variables and their computations are provided in Appendix 1.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Creditor rights	-0.07***	-0.07***	-0.07***	-0.07***	-0.06***	-0.09***	-0.06***	-0.06***	-0.09***	-0.07***
	(-10.87)	(-11.66)	(-11.60)	(-11.11)	(-8.78)	(-13.83)	(-9.61)	(-9.77)	(-12.47)	(-11.20)
Corruption	0.05***									
	(4.93)									
Bureaucracy quality		0.28***								
		(8.81)								
Efficiency			0.07***							
			(4.42)							
Property rights				0.08***						
				(4.48)						
Contract viability					0.11***					
					(9.49)					
Enforcement cost						0.06***				
						(8.90)				
Enforcement time							0.11***			
							(7.43)			
Depth of creditor index								0.05***		
								(5.37)		
Strength of legal rights									0.05***	
									(5.09)	
Information sharing										0.29*
										(2.02)
Log Size	0.19***	0.21***	0.19***	0.20***	0.20***	0.19***	0.18***	0.19***	0.19***	0.19***
	(8.77)	(9.52)	(8.95)	(9.05)	(9.19)	(8.71)	(8.52)	(8.68)	(8.65)	(8.72)
Market to book	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
	(-1.53)	(-1.87)	(-1.70)	(-1.68)	(-1.80)	(-1.70)	(-1.68)	(-1.74)	(-1.80)	(-1.68)
Profitability	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	(1.88)	(1.67)	(1.83)	(1.83)	(1.82)	(1.89)	(1.92)	(1.92)	(1.92)	(1.90)
Book leverage	0.08***	0.08***	0.08***	0.08***	0.08***	0.08***	0.08***	0.08***	0.08***	0.08***
	(11.20)	(11.13)	(11.20)	(11.12)	(11.04)	(11.22)	(11.22)	(11.25)	(11.26)	(11.23)
Maturity	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	(1.77)	(1.82)	(1.82)	(1.78)	(1.62)	(1.84)	(1.83)	(1.88)	(1.77)	(1.82)
Law and order	0.07***	0.05***	0.08***	0.08***	0.07***	0.09***	0.09***	0.10***	0.10***	0.10***
	(4.87)	(3.50)	(6.42)	(6.15)	(5.58)	(6.99)	(7.48)	(7.70)	(8.18)	(7.71)
Log of GDP per cap.	-0.23***	-0.38***	-0.24***	-0.28***	-0.24***	-0.19***	-0.17***	-0.22***	-0.21***	-0.19***
	(-11.36)	(-12.20)	(-10.16)	(-9.85)	(-12.39)	(-10.13)	(-9.08)	(-11.27)	(-11.15)	(-10.00)
Inflation	-0.01	-0.00	-0.00	-0.01	-0.00	-0.01	-0.01	-0.01	-0.01	-0.01
	(-1.26)	(-0.23)	(-0.73)	(-1.05)	(-0.62)	(-0.82)	(-1.51)	(-0.79)	(-0.95)	(-1.18)
Sovereign ratings	0.06***	0.07***	0.08***	0.06***	0.03*	0.07***	0.04**	0.05***	0.08***	0.08***
	(4.17)	(4.71)	(5.19)	(4.05)	(2.16)	(5.18)	(2.62)	(3.35)	(5.26)	(5.30)
Developed country	0.24***	0.15***	0.22***	0.22***	0.18***	0.22***	0.21***	0.21***	0.19***	0.22***
	(9.76)	(5.74)	(9.08)	(9.15)	(7.13)	(9.14)	(8.47)	(8.49)	(7.64)	(9.22)
English legal origin	0.10**	0.02	0.07*	0.07*	0.05	0.10**	0.10**	0.01	0.05	0.09**
	(2.98)	(0.48)	(2.01)	(2.06)	(1.60)	(2.99)	(3.19)	(0.15)	(1.37)	(2.90)
French legal origin	-0.19***	-0.20***	-0.16***	-0.20***	-0.19***	-0.35***	-0.15**	-0.24***	-0.16***	-0.19***
	(-4.21)	(-4.28)	(-3.40)	(-4.32)	(-4.17)	(-6.91)	(-3.18)	(-5.04)	(-3.51)	(-4.06)
German legal origin	-0.39***	-0.49***	-0.46***	-0.39***	-0.43***	-0.44***	-0.39***	-0.49***	-0.43***	-0.43***
	(-11.19)	(-13.88)	(-13.06)	(-10.90)	(-12.42)	(-12.73)	(-11.27)	(-13.54)	(-12.34)	(-12.38)
Constant	-0.35***	-1.04***	-0.36***	-0.35***	-0.64***	-0.41***	-0.43***	-0.38***	-0.45***	-0.76***
	(-3.94)	(-9.58)	(-3.92)	(-3.94)	(-7.07)	(-4.65)	(-4.91)	(-4.29)	(-5.09)	(-4.48)
Observations	91650	91650	91650	91650	91650	91650	91650	91650	91650	91650
Within R^2	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Between R^2	0.17	0.14	0.13	0.15	0.15	0.14	0.14	0.13	0.15	0.14
Overall R^2	0.11	0.08	0.08	0.09	0.09	0.08	0.08	0.08	0.10	0.09
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 2.8. Additional macro level variables and culture

This table reports the results for *Heterogeneity* as the dependent variable. Culture is proxied by various religions as the additional control variable in column 2. All regressions include standard errors clustered at the firm-level and year dummies. *, **, and *** indicate significance at 5, 1 and 0.1 percent levels, respectively. Descriptions of the variables and their computations are provided in Appendix 1. Column one control for the number of debt types that a system of credit in a country can provide. Column 2 control for more macro level variables and column 3 controls for culture.

	(1)	(2)	(3)
Creditor rights	-0.06***	-0.09**	-0.06***
	(-10.44)	(-2.88)	(-8.64)
Log Size	0.18***	0.24***	0.19***
	(9.90)	(8.10)	(10.52)
Market to book	-0.01**	-0.01	-0.01**
	(-2.60)	(-1.19)	(-2.93)
Profitability	0.01*	0.01	0.01*
	(2.22)	(1.20)	(2.02)
Book leverage	0.09***	0.10***	0.09***
	(14.34)	(10.94)	(14.19)
Maturity	0.00	0.02*	0.00
	(0.01)	(2.36)	(0.13)
Law and order	0.05***	0.02	0.07***
	(5.09)	(0.85)	(6.51)
Log of GDP per cap.	-0.13***	-0.13**	-0.30***
	(-7.68)	(-2.67)	(-12.39)
Inflation	-0.03***	0.01	-0.01*
	(-5.41)	(0.56)	(-2.47)
Sovereign ratings	0.03*	-0.09***	-0.05**
	(2.27)	(-3.58)	(-3.17)
Developed country	0.20***	-0.15***	0.09***
	(8.23)	(-3.87)	(3.41)
English legal origin	0.15***	0.17*	0.09**
	(4.72)	(2.56)	(3.10)
French legal origin	-0.09*	0.02	-0.28***
	(-2.12)	(0.20)	(-6.33)
German legal origin	-0.35***	0.04	-0.20***
	(-10.89)	(1.29)	(-5.27)
N. of debt type in country	-0.02***		
	(-3.46)		
Domestic cred. to GDP		0.05	
		(1.46)	
Stocks traded to GDP		-0.02*	
		(-2.38)	
Gdp growth		0.04***	
		(4.11)	
Liquid asset to GDP		-0.02	
		(-0.56)	
Religion=Athiest			-0.56***
			(-11.96)
Religion= Buddhist			-0.07**
			(-3.29)
Religion= Catholic			0.03
			(1.36)
Religion= Hindu			-0.45***
			(-9.31)
Religion= Muslim			0.04
			(1.23)
Religion= Orthodox			0.19
			(1.15)

Constant	-0.36***	0.10	-0.25**
	(-4.69)	(0.97)	(-3.12)
Observations	138801	58592	138801
Within R^2	0.01	0.02	0.01
Between R^2	0.17	0.18	0.17
Overall R^2	0.11	0.13	0.11
Industry effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes

Table 2.9. Instrumental variables estimation: Debt-type heterogeneity and creditor rights

This table provides the second-stage results based on a two stage least square (2SLS) specification using English legal origins and ethnic fractionalization as the instrument variables. *, ** and *** signify significance at the 5%, 1% and 0.1% levels, respectively, based on t-values reported in the parentheses. Clustered standard errors are at the firm-level. The description of all variables and their computations are provided in Appendix 1.

	(1) HHI	(2) SP90
Creditor rights	-0.03***	0.01**
	(-3.39)	(2.76)
Log Size	0.14***	-0.06***
	(21.06)	(-20.53)
Market to book	-0.02***	0.01***
	(-4.96)	(4.19)
Profitability	0.03***	-0.01***
	(7.86)	(-7.31)
Book leverage	0.17***	-0.08***
	(32.66)	(-31.62)
Maturity	0.04***	-0.02***
	(8.17)	(-7.49)
Law and order	-0.11***	0.04***
	(-10.45)	(9.01)
Log of GDP per cap.	-0.36***	0.17***
	(-20.19)	(20.14)
Inflation	0.06***	-0.03***
	(9.09)	(-8.32)
Sovereign ratings	-0.23***	0.11***
	(-17.91)	(16.76)
Developed country	0.68***	-0.30***
	(23.86)	(-22.71)
Constant	0.07	0.44***
	(0.93)	(12.85)
Observations	138801	138801
Adjusted R^2	0.098	0.081
Industry effects	Yes	Yes
Year effects	Yes	Yes

Table 2.10. Sample composition and Tobit regressions

This table reports the results for *Heterogeneity* as the dependent variable for subsamples that exclude U.S. firms in column (1), exclude Japanese firms in column (2) and exclude both U.S. and Japanese firms in columns (3). The last column reports the Tobit regression results for *Heterogeneity* as the dependent variable. All regressions include standard errors clustered at the firm-level and year dummies. *, **, and *** indicate significance at 5, 1 and 0.1 percent levels, respectively. Descriptions of the variables and their computations are provided in Appendix 1.

	(1) **Exclude US**	(2) **Exclude Japan**	(3) **Exclude US & Japan**	(4) **Tobit**
Creditor rights	-0.05***	-0.06***	-0.05***	-0.07***
	(-9.45)	(-9.97)	(-9.45)	(-10.01)
Log Size	0.18***	0.18***	0.18***	0.19***
	(9.78)	(9.83)	(9.78)	(26.56)
Market to book	-0.01**	-0.01**	-0.01**	-0.01**
	(-2.58)	(-2.61)	(-2.58)	(-3.03)
Profitability	0.01*	0.01*	0.01*	0.03***
	(2.26)	(2.25)	(2.26)	(6.00)
Book leverage	0.09***	0.09***	0.09***	0.17***
	(14.28)	(14.28)	(14.28)	(32.03)
Maturity	0.00	0.00	0.00	0.01*
	(0.06)	(0.02)	(0.06)	(2.23)
Law and order	0.07***	0.05***	0.07***	-0.03*
	(6.64)	(5.42)	(6.64)	(-2.31)
Log of GDP per cap.	-0.13***	-0.13***	-0.13***	-0.14***
	(-8.12)	(-8.26)	(-8.12)	(-7.05)
Inflation	-0.02***	-0.03***	-0.02***	-0.03***
	(-3.81)	(-5.23)	(-3.81)	(-3.97)
Sovereign ratings	0.05***	0.04**	0.05***	0.03
	(4.06)	(2.92)	(4.06)	(1.60)
Developed country	0.25***	0.21***	0.25***	0.35***
	(9.81)	(8.61)	(9.81)	(11.05)
English legal origin	0.12***	0.11***	0.12***	0.06
	(3.96)	(3.82)	(3.96)	(1.61)
French legal origin	0.02	-0.11**	0.02	-0.28***
	(0.39)	(-2.62)	(0.39)	(-5.83)
German legal origin	-0.37***	-0.37***	-0.37***	-0.46***
	(-11.72)	(-11.72)	(-11.72)	(-12.56)
Constant	-0.44***	-0.35***	-0.44***	0.03
	(-5.69)	(-4.55)	(-5.69)	(0.34)
Observations	110811	120083	92093	138801
Within R^2	0.01	0.01	0.01	
Between R^2	0.17	0.16	0.16	
Overall R^2	0.11	0.11	0.11	
Pseudo R^2				0.03
Industry effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes

Table 2.11. Cross-Sectional Heterogeneity

This table studies the effects of creditor rights on the cross-section of firms with different levels of asset intangibility, cash flow volatility and opaqueness. The estimates of interest in this table are the interactions of the above variables with the creditor rights index (CR). *, **, and *** indicate significance at the 5, 1 and 0.1 percent levels, respectively. Numbers in parentheses are student t statistics using standard errors clustered at the firm level and using year dummies. Within, between, overall and pseudo r-square values are reported in the last rows of the table. The explanatory variables are defined in Appendix 1.

	(1)	(2)	(3)
Intangibility	0.07***		
	(7.50)		
Intangibility * CR	-0.07***		
	(-8.82)		
Cash flow vol.		0.01	
		(1.32)	
Cash flow vol. *CR		-0.02**	
		(-2.68)	
Opaqueness			2.91***
			(4.04)
Opaqueness *CR			-3.29***
			(-3.85)
Log Size	0.18***	0.18***	0.14***
	(9.79)	(9.72)	(5.35)
Market to book	-0.01**	-0.01**	-0.01*
	(-2.60)	(-2.59)	(-2.47)
Profitability	0.01*	0.01*	0.01
	(2.26)	(2.27)	(0.72)
Book leverage	0.09***	0.09***	0.07***
	(14.27)	(14.26)	(8.24)
Maturity	0.00	0.00	-0.02**
	(0.03)	(0.04)	(-3.03)
Law and order	0.05***	0.04***	0.04**
	(4.83)	(4.30)	(3.05)
Log Gdp per cap.	-0.13***	-0.13***	-0.14***
	(-8.21)	(-8.30)	(-6.53)
Inflation	-0.03***	-0.03***	-0.03***
	(-5.07)	(-4.98)	(-5.65)
Sovereign ratings	0.03*	0.02	0.05*
	(2.46)	(1.47)	(2.25)
Developed country	0.21***	0.20***	0.23***
	(8.59)	(8.31)	(8.48)
English legal origin	0.09**	0.09**	-0.00
	(3.04)	(3.08)	(-0.04)
French legal origin	-0.12**	-0.07	-0.17***
	(-2.94)	(-1.77)	(-3.52)
German legal origin	-0.39***	-0.37***	-0.49***
	(-12.16)	(-11.59)	(-11.78)
Constant	-0.29***	-0.28***	-0.32**
	(-3.87)	(-3.67)	(-3.16)
Observations	138801	138801	56304
Within R^2	0.01	0.01	0.01
Between R^2	0.15	0.15	0.14
Overall R^2	0.08	0.07	0.08
Industry effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes

Table 3.1. Summary statistics

This table reports summary statistics for the main variables used in our analyses and are described in appendix 1. The data are monthly from January 2002 to December 2012. The means, medians and standard deviations for the firm-specific variables over the entire sample period are reported in panel A. Panel B reports the summary statistics for the macroeconomic variables and other proxies for uncertainty which are more systemic than firm-specific. The summary statistics for credit spreads, credit spreads and 3-month T-Bill rates that are reported in panel C are calculated separately for periods of high or low policy uncertainty (PU) based on the time series medians of the Baker, Bloom and Davis (2012) policy uncertainty index (PUI). The Student's t test and the Wilcoxon-Mann-Whitney U test are used to examine the significance of the differences in the means and medians, respectively, for three variables differentiated between low and high PU. Their respective statistics are reported in the parentheses. *, ** and *** indicate significance at the 0.05, 0.01 and 0.001 levels, respectively, based on the traditional critical t-values. ^{d} and ^{e} indicate significance at the 0.05 and 0.01 level based on the sample-size-adjusted critical t-values reported in appendix 2. Obs. refers to observations.

Panel A: Summary statistics for various firm-specific variables

	All			**Investment Grade**			**Speculative Grade**		
Variable	Mean	Std. Dev.	Median	Mean	Std. Dev.	Median	Mean	Std. Dev.	Median
Credit spread (%)	4.95	120.46	1.68	4.16	124.02	1.26	5.69	24.07	3.84
Liquidity	11.81	6.61	12.00	12.38	6.73	13.00	10.99	6.27	11.00
Operating income to sales	-0.86	67.33	0.08	0.12	0.12	0.09	0.09	0.26	0.07
Market leverage	0.33	0.27	0.28	0.27	0.16	0.23	0.46	0.37	0.44
Total debt capitalization	0.60	22.91	0.51	0.47	0.15	0.46	0.94	48.13	0.60
Closest benchmark treasury rate (%)	2.97	1.53	3.18	3.00	1.53	3.21	3.02	1.49	3.21
Coupon (%)	5.73	2.17	5.88	5.45	1.67	5.63	7.07	2.19	7.25
Years to maturity	9.85	8.70	6.76	10.72	9.57	7.34	7.73	6.09	6.29
Amount ($)	367,215	464,148	250,000	470,124	531,960	350,000	187,992	261,807	46,528
Std. dev. of daily excess returns	0.03	0.33	0.02	0.02	0.03	0.02	0.05	0.37	0.03
Obs.		164,541			74,383			37,190	

Table 1. Cont'd

Panel B: Summary statistics for macro variables and uncertainty proxies			
Variable	Mean	Std. Dev.	Median
Term slope	2.05	0.96	2.01
Policy uncertainty	127.96	44.10	136.60
S&P return * 100	0.03	0.21	0.05
Expected GDP ($)	1547.27	1296.67	1395.00
Expected unemployment (%)	7.24	1.88	7.80
Consumer confidence	75.76	10.87	74.30
Expected one year inflation (%)	2.39	2.82	2.61
VXO	21.46	10.37	18.86
News-based component of PU	121.56	49.37	111.49
FedStateLocal - disagreement	93.49	38.34	102.94
CPI dispersion	108.07	29.61	105.01
Uncertainty of tax expiration	784.29	561.13	771.24
Analyst forecast dispersion for GDP	48.73	16.31	44.33

Table 1. Cont'd

Panel C: Summary statistics for three variables differentiated by low and high PU								
	High PU (Obs. = 101,799)			Low PU (Obs. = 74,319)			High PU - Low PU	
Variable	Mean	Std. Dev.	Median	Mean	Std. Dev.	Median	Mean	Median
Total yield	10.69	185.97	5.64	6.07	30.61	4.73	2.93***[e]	-0.61***[e]
							(7.00)	(-67.67)
Credit spread (maturity matched)	6.90	185.96	1.43	3.97	30.59	2.04	4.62***[e]	0.91***[e]
							(4.43)	(76.12)
Credit spread (unmatched)	7.11	166.07	2.58	5.81	30.59	4.43	1.31*	-1.85***[e]
							(2.21)	(124.87)
Three month treasury rate	2.61	1.86	2.84	0.26	0.51	0.11	2.35***[e]	2.74***[e]
							(348.20)	(-250.22)

Table 3.2. Correlations

This table reports the correlations between the various variables used in this paper that are described in appendix 1.

Panel D: Correlation Matrix

	Credit Spread	PUI	Investment grade dummy	Liqui-dity	S&P returns	Operating income to sales	Market lev	Total debt	Pretax Coverage				Closest benchmark treasury rate	Term spread	Coupon	Maturity remain-ing	Amount out-standing	Dummy putable
									D1	D2	D3	D4						
Credit Spread	1.00																	
PUI	0.05	1.00																
Investment grade	-0.01	-0.05	1.00															
Liquidity	-0.02	0.03	0.00	1.00														
S&P returns	-0.11	-0.02	0.00	0.06	1.00													
Operating income	-0.09	-0.11	0.01	0.03	-0.01	1.00												
Market leverage	0.39	0.10	0.02	0.07	-0.02	-0.10	1.00											
Total debt	0.11	0.00	0.04	0.06	-0.01	0.00	0.51	1.00										
Pretax Coverage	0.06	0.00	-0.30	0.02	0.01	-0.12	0.15	0.11	1.00									
Pretax Coverage	-0.02	-0.01	0.11	-0.01	0.00	0.06	-0.03	-0.01	-0.56	1.00								
Pretax Coverage	-0.03	0.02	0.17	0.00	-0.01	0.06	-0.08	-0.06	-0.44	-0.31	1.00							
Pretax Coverage	-0.02	0.00	0.11	-0.02	-0.01	0.03	-0.11	-0.10	-0.26	-0.18	-0.14	1.00						
Closest benchmark	-0.22	-0.40	0.02	-0.04	-0.01	0.03	-0.18	-0.04	-0.01	0.04	-0.03	-0.01	1.00					
Term spread	0.16	0.14	-0.03	0.10	0.02	0.10	0.18	0.10	0.05	-0.03	-0.01	-0.02	-0.23	1.00				
Coupon	0.03	-0.01	0.00	-0.03	0.00	0.00	0.01	-0.01	0.01	0.01	-0.01	-0.01	-0.01	-0.01	1.00			
Maturity	-0.10	-0.44	0.06	0.02	0.00	0.04	-0.08	0.03	-0.01	0.02	0.00	0.01	0.47	-0.06	-0.06	1.00		
Amount	0.02	0.24	-0.04	0.07	0.01	0.00	0.04	0.00	0.00	0.00	0.01	0.00	-0.19	0.11	-0.03	0.08	1.00	
Dummy putable	-0.01	-0.03	-0.17	0.00	0.00	0.00	-0.01	0.00	0.03	-0.02	-0.03	0.03	0.27	-0.02	-0.13	0.07	-0.07	1.00
Election dummy	0.03	0.09	0.00	-0.07	-0.05	-0.20	0.04	-0.02	0.01	-0.01	0.00	0.00	-0.08	-0.08	-0.01	-0.07	0.02	-0.01

Table 3.3. The expected signs of the explanatory variables

This table reports the predicted estimated signs of the explanatory variables (in the last column) according to three influential studies (columns 1 to 3). The first set of 12 variables in rows 1 to 12 are general and firm-specific, the second set of 4 variables in rows 13 to 16 are macro-variables, the third set of six variables in rows 17 to 22 are policy uncertainty variables, and the fourth set in rows 23 and 24 are rating dummies. The methods to calculate some of the variables are not the same across the three studies.

		Collin- Dufresne et al. (2001)	Campbell and Taksler (2003)	Ericsson *et al.* (2009)	This Paper
1	Liquidity				-
2	S&P Return	-		-	-
3	Operating income to sales		-		-
4	Market Leverage	+	+/-	+	+
5	Total debt capitalization				+
6	3-month T-Bill rate (or closest benchmark)	-	-		+
7	Term Spread (slope) or 10 year yield	-	-	-	-
8	Coupon		+		+
9	Maturity		+		+
10	Putability				+
11	Amount or Issue size		-		-
12	Pre-Tax coverage		-		-
13	Expected GDP				-
14	Expected unemployment				+
15	Consumer Confidence				-
16	Expected one-year inflation				+
17	Std. dev. of daily excess returns		+	+	+
18	VIX or VXO	+			+
19	Election indicator				-
20	Analyst forecast dispersion				+
21	PUI				-
22	STD. of PUI				+
23	Investment Grade		+		-
24	Speculative Grade		+		-

Table 3.4. Policy uncertainty and credit spreads

This table reports bond fixed-effects panel regression results with firm clustered standard errors for corporate bond credit spreads and various regressors for the period 2002-2012. A detailed description of the variables is given in appendix 1. The election dummy is equal to 1 for the presidential election years. Macroeconomic determinants include: 3-month T-Bill rate and the Term slope. Bond-specific determinants include: Amount outstanding (Amount), Coupon, Years-to-maturity (number of years to the bond's maturity), Liquidity (number of monthly transactions for each bond) and Putability (Putable dummy). S&P return is the return of the S&P 500 index over the same quarter as the bond. Firm-specific accounting determinants include: Pre-tax interest coverage dummies D1 to D4, Operating income to sales, Market leverage, and Total debt to capitalization. Eleven monthly dummies are included in the regressions to control for seasonality but are not tabulated. OLS t-statistics appear in the parentheses. $^{+}$, *, ** and *** indicate significance at the 0.1, 0.05, 0.01 and 0.001 levels, respectively, based on the traditional critical t-values.

VARIABLES	(1) Credit spread	(2) Credit spread	(3) Credit spread	(4) Credit spread	(7) Credit spread	(8) Credit spread	(9) Credit spread	(10) Credit spread
Policy uncertainty	43.04***			35.44***		26.16***		24.99***
	(60.09)			(45.45)		(35.42)		(29.33)
Rating							24.08***	27.10***
							(5.68)	(6.53)
Liquidity							-4.89***	-4.56***
							(-7.79)	(-7.28)
S&P return							-12.25***	-11.82***
							(-28.49)	(-27.83)
Operating income to sales					-6.14***	-5.84***	-6.84***	-6.46***
					(-11.16)	(-10.91)	(-11.02)	(-10.70)
Market leverage					45.36***	41.47***	46.63***	42.70***
					(43.63)	(39.70)	(39.35)	(35.76)
Total debt capitalization					-13.20***	-11.98***	-14.22***	-13.33***
					(-14.65)	(-13.53)	(-13.64)	(-13.04)
Pre-Tax coverage D1					-15.84**	-12.69*	-14.01*	-11.14+
					(-3.16)	(-2.56)	(-2.34)	(-1.88)
Pre-Tax coverage D2					-18.32***	-16.32***	-16.72**	-14.71*
					(-3.77)	(-3.38)	(-2.88)	(-2.56)
Pre-Tax coverage D3					-17.92***	-17.21***	-20.03***	-19.14***
					(-4.02)	(-3.89)	(-3.73)	(-3.61)
Closest treasury rate		-43.46***	-39.67***	-23.44***	-28.68***	-17.61***	-32.23***	-21.10***
		(-40.56)	(-36.40)	(-20.55)	(-27.34)	(-16.03)	(-26.84)	(-17.02)
Term Slope		7.04***	10.29***	3.75***	6.25***	1.73**	5.14***	1.07
		(9.51)	(13.66)	(5.55)	(8.73)	(2.63)	(5.92)	(1.33)
Coupon		6.74***	6.72***	6.37**	5.81**	5.60**	2.28	1.83
		(3.46)	(3.45)	(3.26)	(3.12)	(3.02)	(1.01)	(0.81)

Years to maturity		21.37***	21.41***	24.19***	16.67***	19.10***	20.16***	21.88***
		(15.15)	(15.19)	(16.78)	(12.41)	(14.00)	(13.18)	(14.06)
Amount		-24.35***	-25.54***	-33.48***	-21.18***	-27.37***	-15.26***	-20.38***
		(-10.71)	(-11.22)	(-13.99)	(-9.90)	(-12.31)	(-5.50)	(-7.08)
Dummy putable		2.97	-3.29	-27.78+	-1.73	-19.93	7.57	-10.09
		(0.19)	(-0.21)	(-1.70)	(-0.11)	(-1.27)	(0.35)	(-0.45)
Election			28.39***	27.49***	27.86***	27.26***	17.43***	17.17***
			(19.73)	(19.20)	(19.43)	(19.16)	(10.63)	(10.43)
Constant	12.75***	140.93***	123.05***	76.66***	101.40***	67.98***	116.48***	82.80***
	(19.46)	(38.05)	(32.24)	(19.75)	(18.32)	(12.18)	(18.18)	(13.02)
Observations	164,541	164,541	164,541	164,541	164,541	164,541	111,573	111,573
Adjusted R-squared	0.10	0.10	0.11	0.15	0.22	0.24	0.27	0.29
Firm Fixed Effect	YES	YES	YES	YES	YES	YES	YES	YES
Monthly Dummies	YES	YES	YES	YES	YES	YES	YES	YES
Firm Clustering	YES	YES	YES	YES	YES	YES	YES	YES

Table 3.5. Policy uncertainty and corporate credit spreads across investment and speculative credit ratings

This table reports bond fixed-effects panel regression results with firm clustered standard errors for investment and speculative grade corporate bond credit spreads and various regressors for the period 2002-2012. A detailed description of the variables is given in appendix 1. The election dummy is equal to 1 for the presidential election years. Macroeconomic determinants include: 3-month T-Bill rate and the Term slope. Bond-specific determinants include: Amount outstanding (Amount), Coupon, Years-to-maturity (number of years to the bond's maturity), Liquidity (number of monthly transactions for each bond) and Putability (Putable dummy). S&P return is the return of the S&P 500 index over the same quarter as the bond. Firm-specific accounting determinants include: Pre-tax interest coverage dummies D1 to D3 (D4 excluded by STATA due to collinearity), Operating income to sales, Market leverage, and Total debt to capitalization. Eleven monthly dummies are included in the regressions to control for seasonality but are not tabulated. OLS t-statistics appear in the parentheses. $^{+}$, *, ** and *** indicate significance at the 0.1, 0.05, 0.01 and 0.001 levels, respectively, based on the traditional critical t-values.

	Investment grades				Speculative grades			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES								
Policy uncertainty		33.29***		24.76***		8.11***		5.43***
		(29.39)		(22.79)		(25.81)		(19.67)
Liquidity	-3.36***	-3.06***	-4.41***	-4.09***	-0.65**	-0.58*	-1.15***	-1.07***
	(-3.87)	(-3.55)	(-5.36)	(-4.98)	(-2.85)	(-2.56)	(-5.84)	(-5.44)
S&P return	-16.00***	-15.51***	-14.81***	-14.56***	-1.83***	-1.55***	-1.49***	-1.33***
	(-26.59)	(-26.40)	(-25.50)	(-25.49)	(-14.49)	(-12.36)	(-13.34)	(-11.95)
Operating income to sales			-4.74***	-4.48***			-1.93***	-1.78***
			(-6.26)	(-6.06)			(-9.28)	(-8.85)
Market leverage			44.31***	40.51***			11.00***	10.18***
			(28.80)	(26.16)			(28.24)	(26.22)
Total debt capitalization			-15.09***	-14.35***			-2.28***	-2.05***
			(-10.78)	(-10.49)			(-7.15)	(-6.57)
Pre-Tax coverage D1			-2.80	-0.51			-6.82**	-5.86*
			(-0.41)	(-0.08)			(-2.60)	(-2.17)
Pre-Tax coverage D2			-7.45	-5.29			-5.22*	-4.73+
			(-1.15)	(-0.83)			(-1.99)	(-1.75)
Pre-Tax coverage D3			-17.13**	-16.08**			-2.25	-2.05
			(-2.90)	(-2.77)			(-0.86)	(-0.77)
Closest treasury rate	-44.54***	-27.90***	-32.99***	-21.65***	-9.75***	-5.97***	-6.83***	-4.51***
	(-28.42)	(-17.08)	(-21.74)	(-13.81)	(-24.23)	(-14.43)	(-18.66)	(-12.03)
Term Slope	3.28**	-2.33*	0.41	-3.46***	3.02***	1.62***	1.97***	1.10***
	(2.79)	(-2.24)	(0.37)	(-3.43)	(8.87)	(5.12)	(6.40)	(3.76)
coupon	7.69*	6.88*	7.55*	6.91*	-0.73	-0.75	-0.75	-0.76
	(2.25)	(2.05)	(2.34)	(2.18)	(-0.99)	(-0.97)	(-1.16)	(-1.14)
Years to maturity	31.73***	33.13***	26.32***	27.86***	3.66***	4.12***	2.63***	3.02***
	(14.97)	(15.34)	(12.94)	(13.51)	(7.45)	(8.38)	(5.95)	(6.82)
Amount	-16.17***	-23.76***	-14.37***	-20.15***	-5.52***	-6.66***	-4.13***	-4.99***
	(-3.98)	(-5.53)	(-3.65)	(-4.88)	(-7.29)	(-8.25)	(-6.11)	(-7.16)
Dummy putable	36.50	11.24	35.65	16.75	-4.41	-10.16*	-4.72	-8.52+
	(1.10)	(0.32)	(1.06)	(0.47)	(-0.99)	(-2.17)	(-1.00)	(-1.79)
Election dummy	19.69***	20.15***	22.69***	22.82***	1.47*	1.02+	1.32*	1.04+
	(9.53)	(9.55)	(11.13)	(11.06)	(2.50)	(1.77)	(2.35)	(1.88)
Constant	144.22***	95.66***	111.79***	77.42***	31.99***	21.39***	27.82***	20.66***
	(29.82)	(19.30)	(15.64)	(10.91)	(24.25)	(16.25)	(9.85)	(7.10)
Observations	74,383	74,383	74,383	74,383	37,190	37,190	37,190	37,190
Adjusted R-squared	0.16	0.19	0.25	0.26	0.24	0.28	0.39	0.41
Firm Fixed Effect	YES	YES	YES	YES	YES	YES	YES	YES
Monthly Dummies	YES	YES	YES	YES	YES	YES	YES	YES
Firm Clustering	YES	YES	YES	YES	YES	YES	YES	YES

Table 3.6. How important is each components of the PUI?

The table shows bond fixed effect regression estimates of credit spreads on the components of the policy uncertainty index (PUI), firm controls, bond characteristics and election dummies with firm clustered standard errors for the period 2002-2012. A detailed description of the variables is given in appendix 1. The election dummy is equal to 1 for the presidential election years. Macroeconomic determinants include: 3-month T-Bill rate and the Term slope. Bond-specific determinants include: Amount outstanding (Amount), Coupon, Years-to-maturity (number of years to the bond's maturity), Liquidity (number of monthly transactions for each bond) and Putability (Putable dummy). S&P return is the return of the S&P 500 index over the same quarter as the bond. Firm-specific accounting determinants include: Pre-tax interest coverage dummies D1 to D3 (D4 excluded by STATA due to collinearity), Operating income to sales, Market leverage, and Total debt to capitalization. Eleven monthly dummies are included in the regressions to control for seasonality but are not tabulated. OLS t-statistics appear in the parentheses. $^{+}$, *, ** and *** indicate significance at the 0.1, 0.05, 0.01 and 0.001 levels, respectively, based on the traditional critical t-values.

VARIABLES	(1)	(2)	(3)	(4)
News-Based component of PUI	27.76***			
	(39.43)			
FedStateLocal-Ex-disagreement		6.14***		
		(7.92)		
CPI dispersion			27.81***	
			(47.68)	
Uncertainty of tax expiration				-57.46***
				(-41.14)
Rating	28.67***	24.02***	23.35***	27.76***
	(6.96)	(5.68)	(5.79)	(6.51)
Liquidity	-4.00***	-5.01***	-5.00***	-2.93***
	(-6.46)	(-7.96)	(-8.33)	(-4.99)
S&P return	-9.70***	-12.85***	-13.54***	-7.81***
	(-23.68)	(-30.51)	(-32.29)	(-20.46)
Operating income to sales	-6.07***	-6.98***	-6.43***	-5.29***
	(-10.27)	(-11.25)	(-10.57)	(-8.97)
Market leverage	41.32***	45.99***	45.13***	42.85***
	(35.02)	(38.64)	(39.76)	(39.33)
Total debt capitalization	-12.93***	-14.16***	-13.38***	-12.70***
	(-12.85)	(-13.66)	(-13.65)	(-13.29)
Pre-Tax coverage D1	-10.75+	-14.30*	-9.99+	-9.02+
	(-1.85)	(-2.40)	(-1.75)	(-1.65)
Pre-Tax coverage D2	-14.31*	-16.86**	-13.54*	-10.55*
	(-2.54)	(-2.91)	(-2.45)	(-1.99)
Pre-Tax coverage D3	-18.17***	-20.17***	-17.83***	-11.53*
	(-3.49)	(-3.77)	(-3.50)	(-2.35)
Closest benchmark treasury rate	-21.04***	-30.19***	-30.06***	-52.22***
	(-17.12)	(-25.32)	(-25.90)	(-43.84)
Term Slope	2.75***	3.62***	-6.20***	10.40***
	(3.37)	(4.15)	(-7.64)	(11.70)
Coupon	2.04	2.18	2.30	3.94
	(0.91)	(0.96)	(1.06)	(1.59)
Years to maturity	18.89***	20.92***	21.89***	-0.32
	(12.43)	(13.63)	(15.26)	(-0.23)
Amount	-17.91***	-16.73***	-18.00***	8.57**
	(-6.43)	(-5.93)	(-6.51)	(3.15)
Dummy putable	-5.56	4.25	4.20	68.54***
	(-0.25)	(0.20)	(0.19)	(3.40)
Election dummy	13.53***	19.95***	15.30***	25.81***
	(8.50)	(11.89)	(9.79)	(17.40)
Constant	81.89***	111.36***	104.40***	151.92***
	(13.05)	(17.51)	(17.04)	(25.98)
Observations	111,573	111,573	111,573	111,573
Adjusted R-squared	0.30	0.27	0.31	0.36
Firm Fixed Effect	YES	YES	YES	YES
Monthly Dummies	YES	YES	YES	YES
Firm Clustering	YES	YES	YES	YES

Table 3.7. Policy uncertainty and corporate credit spreads in different economic conditions

The table reports our baseline regression estimates controlling for the impacts of different economic conditions with firm fixed effects and clustered standard errors for the period 2002-2012. A detailed description of the variables is given in appendix 1. The election dummy is equal to 1 for the presidential election years. Macroeconomic determinants include: 3-month T-Bill rate and the Term slope. Bond-specific determinants include: Amount outstanding (Amount), Coupon, Years-to-maturity (number of years to the bond's maturity), Liquidity (number of monthly transactions for each bond) and Putability (Putable dummy). S&P return is the return of the S&P 500 index over the same quarter as the bond. Firm-specific accounting determinants include: Pre-tax interest coverage dummies D1 to D3 (D4 excluded by STATA due to collinearity), Operating income to sales, Market leverage, and Total debt to capitalization. Eleven monthly dummies are included in the regressions to control for seasonality but are not tabulated. OLS t-statistics appear in the parentheses. $^{+}$, *, ** and *** indicate significance at the 0.1, 0.05, 0.01 and 0.001 levels, respectively, based on the traditional critical t-values.

VARIABLES	(1) Recession	(2) Expansion	(3) Recession	(4) Expansion
Policy uncertainty	93.12***	23.53***	30.65***	5.04***
	(81.98)	(37.94)	(7.24)	(6.86)
Ratings			52.76***	30.73***
			(6.03)	(8.20)
Liquidity			-4.71***	0.53
			(-5.22)	(1.03)
S&P return			-21.55***	4.46***
			(-13.38)	(13.52)
Operating income to sales			-5.42***	-1.50**
			(-5.11)	(-2.97)
Market leverage			22.26***	22.18***
			(11.73)	(21.92)
Total debt capitalization			-2.40	-6.00***
			(-1.60)	(-7.56)
Pre-Tax coverage D1			-3.40	-3.04
			(-0.48)	(-0.69)
Pre-Tax coverage D2			-9.88	-4.01
			(-1.36)	(-0.95)
Pre-Tax coverage D3			-5.73	-6.38+
			(-0.85)	(-1.65)
Closest benchmark treasury rate			-45.98***	-26.98***
			(-9.44)	(-26.59)
Term Slope			-25.89***	-7.79***
			(-7.73)	(-10.56)
coupon			4.61	2.21
			(0.79)	(1.20)
Years to maturity			2.64	8.68***
			(0.45)	(7.40)
Amount			4.26	-1.26
			(0.43)	(-0.59)
Dummy putable			127.64	19.65
			(1.58)	(1.03)
Election dummy			-80.07***	-41.07***
			(-7.14)	(-23.11)
Constant	100.81***	-25.16***	473.09***	73.09***
	(306.16)	(-636.13)	(31.06)	(14.83)
Observations	28,239	136,302	19,106	92,467
Adjusted R-squared	0.52	0.10	0.74	0.26
Firm Fixed Effect	YES	YES	YES	YES
Monthly Dummies	YES	YES	YES	YES
Firm Clustering	YES	YES	YES	YES

Table 3.8. Omitted variables: Business cycles

The table reports our baseline regression estimates controlling for the omitted business cycles variables with firm fixed effects and clustered standard errors for the period 2002-2012. Our business cycle controls are expected GDP, expected unemployment rate and expected one year inflation calculated quarterly from the survey of professional forecasters from the Philadelphia Federal Reserve Bank, and the Michigan Confidence Index developed by the University of Michigan. A detailed description of the variables is given in appendix 1. The election dummy is equal to 1 for the presidential election years. Macroeconomic determinants include: 3-month T-Bill rate and the Term slope. Bond-specific determinants include: Amount outstanding (Amount), Coupon, Years-to-maturity (number of years to the bond's maturity), Liquidity (number of monthly transactions for each bond) and Putability (Putable dummy). S&P return is the return of the S&P 500 index over the same quarter as the bond. Firm-specific accounting determinants include: Pre-tax interest coverage dummies D1 to D3 (D4 excluded by STATA due to collinearity), Operating income to sales, Market leverage, and Total debt to capitalization. Eleven monthly dummies are included in the regressions to control for seasonality but are not tabulated. OLS t-statistics appear in the parentheses. $^{+}$, *, ** and *** indicate significance at the 0.1, 0.05, 0.01 and 0.001 levels, respectively, based on the traditional critical t-values.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(7)	(8)	(9)	(10)
Policy uncertainty					24.56***	18.27***	27.55***	23.89***	30.79***
					(31.46)	(23.44)	(35.98)	(28.99)	(31.68)
Ratings	15.51***	21.59***	24.61***	24.62***	18.52***	24.01***	24.53***	27.46***	20.27***
	(3.76)	(5.43)	(6.98)	(5.88)	(4.61)	(6.07)	(6.96)	(6.67)	(5.76)
Liquidity	-5.95***	-5.29***	-2.52***	-4.77***	-5.61***	-5.01***	-2.52***	-4.46***	-3.24***
	(-10.12)	(-8.94)	(-4.75)	(-7.74)	(-9.62)	(-8.40)	(-4.75)	(-7.23)	(-6.29)
S&P return	-9.52***	-12.38***	-3.42***	-13.79***	-9.12***	-12.06***	-3.40***	-13.25***	-4.20***
	(-23.70)	(-30.23)	(-10.34)	(-32.69)	(-23.08)	(-29.58)	(-10.29)	(-31.98)	(-13.00)
Operating income to sales	-6.21***	-6.19***	-4.67***	-6.45***	-5.84***	-5.97***	-4.67***	-6.12***	-4.16***
	(-10.54)	(-10.68)	(-8.88)	(-10.81)	(-10.15)	(-10.39)	(-8.88)	(-10.46)	(-8.16)
Market leverage	39.15***	38.59***	34.86***	44.19***	35.33***	36.43***	34.93***	40.64***	29.37***
	(35.21)	(33.66)	(34.39)	(37.85)	(31.58)	(31.41)	(34.41)	(34.39)	(29.59)
Total debt capitalization	-10.80***	-12.11***	-9.27***	-13.83***	-9.95***	-11.65***	-9.27***	-13.02***	-7.45***
	(-11.28)	(-12.70)	(-11.18)	(-13.59)	(-10.62)	(-12.26)	(-11.18)	(-12.99)	(-9.47)
Pre-Tax coverage D1	-6.48	-10.75+	0.16	-16.11**	-3.70	-8.94	0.14	-13.18*	1.15
	(-1.14)	(-1.91)	(0.03)	(-2.73)	(-0.66)	(-1.59)	(0.03)	(-2.26)	(0.24)
Pre-Tax coverage D2	-10.38+	-14.02*	-5.94	-18.04**	-8.43	-12.79*	-5.95	-16.00**	-4.59
	(-1.88)	(-2.55)	(-1.26)	(-3.15)	(-1.54)	(-2.33)	(-1.27)	(-2.82)	(-0.99)
Pre-Tax coverage D3	-17.69***	-19.47***	-11.09*	-20.28***	-16.83***	-18.87***	-11.08*	-19.41***	-10.89*
	(-3.45)	(-3.81)	(-2.55)	(-3.83)	(-3.32)	(-3.70)	(-2.55)	(-3.70)	(-2.54)
Closest treasury rate	-29.83***	-16.27***	-19.36***	-28.44***	-18.90***	-9.55***	-19.62***	-18.13***	-15.20***
	(-26.43)	(-13.53)	(-17.84)	(-23.64)	(-16.23)	(-7.67)	(-17.99)	(-14.56)	(-13.44)
Term Slope	-4.33***	-21.04***	-7.00***	6.85***	-8.27***	-21.69***	-6.94***	2.82***	-10.36***
	(-5.09)	(-23.65)	(-10.01)	(7.72)	(-10.41)	(-24.27)	(-10.05)	(3.39)	(-11.85)
coupon	1.00	1.54	2.45	2.24	0.56	1.28	2.46	1.81	1.65
	(0.48)	(0.72)	(1.24)	(1.00)	(0.27)	(0.59)	(1.24)	(0.81)	(0.87)
Years to maturity	13.67***	14.36***	19.40***	18.84***	15.39***	16.12***	19.35***	20.60***	14.53***
	(9.96)	(9.97)	(16.24)	(12.58)	(11.13)	(10.86)	(16.11)	(13.50)	(12.58)
Amount	-12.00***	-20.09***	-21.54***	-14.80***	-17.05***	-23.41***	-21.42***	-19.73***	-18.91***
	(-4.51)	(-7.19)	(-8.15)	(-5.39)	(-6.18)	(-8.04)	(-8.04)	(-6.92)	(-7.14)
Dummy putable	17.81	3.60	-2.69	6.07	0.39	-8.97	-2.24	-10.69	2.23
	(0.84)	(0.16)	(-0.12)	(0.28)	(0.02)	(-0.39)	(-0.10)	(-0.48)	(0.10)
Election dummy	18.90***	47.75***	26.11***	23.07***	18.64***	44.87***	26.15***	22.33***	32.10***
	(12.11)	(25.66)	(18.74)	(12.89)	(11.85)	(24.20)	(18.77)	(12.52)	(18.99)
Expected GDP	-31.72***				-31.55***				13.28***
	(-37.74)				(-38.29)				(14.42)
Expected unemployment		47.45***				43.25***			-46.34***
		(36.91)				(34.91)			(-70.85)
Consumer confidence			-53.81***				-45.27***		-13.42***
			(-70.65)				(-69.43)		(-17.73)
Expected one year inflation				-13.84***				-12.65***	-11.84***
				(-20.43)				(-19.39)	(-22.38)
Constant	100.27**	55.74***	74.90***	110.09**	67.25***	36.50***	75.67***	78.45***	61.85***
	(16.39)	(9.01)	(14.02)	(17.36)	(11.05)	(5.85)	(14.28)	(12.43)	(11.54)
Observations	111,573	111,573	111,573	111,573	111,573	111,573	111,573	111,573	111,573
Adjusted R-squared	0.33	0.32	0.41	0.28	0.35	0.33	0.41	0.30	0.44
Firm Fixed Effect	YES	YES	YES	YES	YES	YES	YES	YES	YES
Monthly Dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm Clustering	YES	YES	YES	YES	YES	YES	YES	YES	YES

Table 3.9. Omitted variables: Economic uncertainty

The table reports our baseline regression estimates controlling for the omitted economic uncertainty variables with firm fixed effects and clustered standard errors for the period 2002-2012. Our controls for economic uncertainty are the std. dev. of a firm's daily returns over those of the CRSP value-weighted index in percent over the preceding 180 days, dispersion of forecasted GDP calculated quarterly from the survey of professional forecasters available from the Philadelphia Federal Reserve Bank, and the monthly VXO implied volatility index from the CBOE. A detailed description of the variables is given in appendix 1. The election dummy is equal to 1 for the presidential election years. Macroeconomic determinants include: 3-month T-Bill rate and the Term slope. Bond-specific determinants include: Amount outstanding (Amount), Coupon, Years-to-maturity (number of years to the bond's maturity), Liquidity (number of monthly transactions for each bond) and Putability (Putable dummy). S&P return is the return of the S&P 500 index over the same quarter as the bond. Firm-specific accounting determinants include: Pre-tax interest coverage dummies D1 to D3 (D4 excluded by STATA due to collinearity), Operating income to sales, Market leverage, and Total debt to capitalization. Eleven monthly dummies are included in the regressions to control for seasonality but are not tabulated. OLS t-statistics appear in the parentheses. $^{+}$, *, ** and *** indicate significance at the 0.1, 0.05, 0.01 and 0.001 levels, respectively, based on the traditional critical t-values.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Policy uncertainty				22.17***	22.68***	16.79***	25.12***
				(27.22)	(30.84)	(22.30)	(34.41)
Ratings	12.02**	35.91***	24.75***	14.98***	34.90***	26.75***	28.57***
	(3.01)	(10.23)	(6.99)	(3.84)	(9.93)	(7.62)	(8.36)
Liquidity	-4.35***	0.28	-2.44***	-4.06***	0.48	-2.30***	0.54
	(-7.68)	(0.56)	(-4.70)	(-7.19)	(0.96)	(-4.40)	(1.15)
S&P return	-14.40***	12.61***	-14.08***	-13.98***	14.32***	-13.73***	7.55***
	(-35.88)	(34.45)	(-35.79)	(-35.27)	(40.76)	(-35.41)	(22.53)
Operating income to sales	-5.36***	-3.33***	-4.69***	-5.06***	-3.30***	-4.50***	-2.64***
	(-9.47)	(-6.74)	(-8.75)	(-9.12)	(-6.72)	(-8.49)	(-5.52)
Market leverage	35.39***	21.87***	35.61***	32.17***	22.44***	33.35***	18.83***
	(31.46)	(22.34)	(35.51)	(28.50)	(23.29)	(32.91)	(20.76)
Total debt capitalization	-11.69***	-7.22***	-10.17***	-10.96***	-7.24***	-9.71***	-6.15***
	(-12.60)	(-9.63)	(-12.46)	(-12.05)	(-9.77)	(-11.97)	(-8.88)
Pre-Tax coverage D1	-5.60	-4.78	-17.46***	-3.25	-5.90	-15.41**	-5.57
	(-1.07)	(-1.09)	(-3.61)	(-0.63)	(-1.37)	(-3.19)	(-1.39)
Pre-Tax coverage D2	-7.36	-7.60+	-15.72***	-5.79	-8.18*	-14.40**	-5.95
	(-1.44)	(-1.80)	(-3.36)	(-1.15)	(-1.98)	(-3.08)	(-1.55)
Pre-Tax coverage D3	-12.19*	-11.00**	-16.16***	-11.58*	-10.86**	-15.69***	-8.28*
	(-2.57)	(-2.80)	(-3.75)	(-2.47)	(-2.81)	(-3.64)	(-2.32)
Closest treasury rate	-28.27***	-12.13***	-26.40***	-18.49***	-17.74***	-19.12***	-16.64***
	(-25.72)	(-12.37)	(-25.44)	(-16.54)	(-19.00)	(-18.17)	(-18.55)
Term Slope	-0.34	-9.08***	-3.55***	-3.82***	-7.58***	-5.98***	-10.45***
	(-0.41)	(-13.39)	(-5.02)	(-4.92)	(-11.53)	(-8.61)	(-16.16)
coupon	2.48	3.17+	2.66	2.07	3.53+	2.34	3.48+
	(1.17)	(1.69)	(1.36)	(0.99)	(1.86)	(1.18)	(1.91)
Years to maturity	13.79***	2.47*	20.36***	15.45***	-0.05	21.51***	1.72
	(10.10)	(2.14)	(17.02)	(11.12)	(-0.04)	(17.47)	(1.58)
Amount	-7.98**	-5.10*	-17.54***	-12.69***	-0.97	-20.91***	-2.10
	(-3.16)	(-2.28)	(-6.86)	(-4.88)	(-0.43)	(-7.85)	(-0.95)
Dummy putable	6.29	9.98	2.08	-9.35	21.62	-9.60	15.78
	(0.29)	(0.46)	(0.09)	(-0.42)	(1.01)	(-0.42)	(0.72)
Election dummy	14.68***	19.61***	27.12***	14.52***	19.95***	26.61***	22.03***
	(9.40)	(14.18)	(18.80)	(9.30)	(14.76)	(18.30)	(16.78)
Idiosyncratic risk	38.17***			37.28***			68.57***
	(42.71)			(42.27)			(87.89)
VXO		74.98***					19.99***
		(81.22)			69.99***		(40.39)
GDP forecast dispersion			49.04***		(83.52)	47.35***	12.27***
			(68.79)			(67.74)	(19.98)
Constant	98.32***	47.41***	94.60***	68.86***	63.77***	72.73***	58.29***
	(17.02)	(9.75)	(17.99)	(12.04)	(13.49)	(13.86)	(13.01)
Observations	111,573	111,573	111,573	111,573	111,573	111,573	111,573
Adjusted R-squared	0.36	0.51	0.40	0.37	0.52	0.41	0.55
Firm Fixed Effect	YES	YES	YES	YES	YES	YES	YES
Monthly Dummies	YES	YES	YES	YES	YES	YES	YES
Firm Clustering	YES	YES	YES	YES	YES	YES	YES

Table 3.10. Addressing Endogeneity using US/ Canada PUI Regression Residuals

This table repeats our base regression model using residuals of the regression of US policy uncertainty on the Canadian policy uncertainty index to mitigate endogeneity concerns. A detailed description of the variables is given in appendix 1. The election dummy is equal to 1 for the presidential election years. Macroeconomic determinants include: 3-month T-Bill rate and the Term slope. Bond-specific determinants include: Amount outstanding (Amount), Coupon, Years-to-maturity (number of years to the bond's maturity), Liquidity (number of monthly transactions for each bond) and Putability (Putable dummy). S&P return is the return of the S&P 500 index over the same quarter as the bond. Firm-specific accounting determinants include: Pre-tax interest coverage dummies D1 to D3 (D4 excluded by STATA due to collinearity), Operating income to sales, Market leverage, and Total debt to capitalization. Eleven monthly dummies are included in the regressions to control for seasonality but are not tabulated. OLS t-statistics appear in the parentheses. $^{+}$, *, ** and *** indicate significance at the 0.1, 0.05, 0.01 and 0.001 levels, respectively, based on the traditional critical t-values.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Policy uncertainty	42.68***			35.41***		34.88***		26.06***		25.04***
	(58.38)			(44.25)		(37.72)		(34.45)		(28.67)
Rating					49.91***	51.05***			23.20***	26.11***
					(10.90)	(11.47)			(5.42)	(6.23)
Liquidity					-4.02***	-3.63***			-5.11***	-4.73***
					(-5.80)	(-5.27)			(-7.93)	(-7.35)
S&P return					-14.08***	-13.28***			-12.59***	-12.15***
					(-30.94)	(-29.64)			(-28.78)	(-28.04)
Operating income to							-6.48***	-6.18***	-7.24***	-6.87***
							(-11.51)	(-11.32)	(-11.54)	(-11.27)
Market leverage							45.85***	41.97***	46.93***	43.01***
							(43.39)	(39.48)	(38.90)	(35.36)
Total debt							-13.51***	-12.29***	-14.33***	-13.45***
							(-14.72)	(-13.61)	(-13.41)	(-12.83)
Pre-Tax coverage D1							-22.53***	-19.38***	-19.19**	-16.57**
							(-4.54)	(-3.94)	(-3.14)	(-2.75)
Pre-Tax coverage D2							-24.23***	-22.26***	-21.60***	-19.90***
							(-4.99)	(-4.61)	(-3.64)	(-3.39)
Pre-Tax coverage D3							-23.11***	-22.51***	-24.21***	-23.70***
							(-5.13)	(-5.04)	(-4.39)	(-4.36)
Closest bench.		-42.83***	-39.03***	-22.84***	-43.53***	-26.61***	-28.05***	-17.04***	-31.93***	-20.77***
		(-39.02)	(-34.95)	(-19.55)	(-33.76)	(-19.92)	(-26.12)	(-15.15)	(-26.07)	(-16.40)
Term Slope		7.46***	10.70***	4.12***	9.23***	3.05***	6.66***	2.13**	5.44***	1.34
		(9.85)	(13.89)	(5.95)	(9.74)	(3.56)	(9.09)	(3.16)	(6.12)	(1.62)
coupon		7.01***	6.93***	6.66***	2.52	1.88	5.97**	5.83**	2.18	1.72
		(3.53)	(3.49)	(3.34)	(1.01)	(0.75)	(3.15)	(3.08)	(0.94)	(0.74)
Years to maturity		21.30***	21.32***	24.13***	25.71***	27.46***	16.21***	18.70***	20.01***	21.77***
		(14.66)	(14.68)	(16.23)	(15.57)	(16.21)	(11.73)	(13.32)	(12.70)	(13.56)
Amount		-24.44***	-25.63***	-33.59***	-19.26***	-26.05***	-21.19***	-27.39***	-15.25***	-20.45***
		(-10.45)	(-10.92)	(-13.63)	(-6.38)	(-8.23)	(-9.63)	(-11.98)	(-5.33)	(-6.89)
Dummy putable		4.83	-1.33	-25.19	12.37	-11.61	0.59	-17.13	12.96	-4.39
		(0.30)	(-0.08)	(-1.51)	(0.57)	(-0.50)	(0.04)	(-1.06)	(0.59)	(-0.19)
Election dummy			28.37***	27.41***	16.28***	16.03***	28.08***	27.42***	17.80***	17.51***
			(19.32)	(18.76)	(9.62)	(9.39)	(19.25)	(18.95)	(10.70)	(10.50)
Constant	12.85***	139.33***	121.34***	74.88***	142.61***	93.60***	104.96***	71.62***	120.02***	86.43***
	(19.39)	(36.84)	(31.10)	(18.86)	(34.09)	(22.07)	(18.75)	(12.69)	(18.27)	(13.27)
Observations	156,912	156,912	156,912	156,912	106,629	106,629	156,912	156,912	106,629	106,629
Adjusted R-squared	0.10	0.10	0.11	0.15	0.16	0.20	0.21	0.24	0.27	0.29
Firm Fixed Effect	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Monthly Dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm Clustering	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Table 3.11. Instrumental variable analysis

This table replicates our main results reported in Table 4 using a two-stage least-squares approach with three different instruments, including (a) difference in the relative legislative strength of the two main parties, (b) the level of political polarization and (c) the interaction of the two. A detailed description of the variables is given in appendix 1. The election dummy is equal to 1 for the presidential election years. Macroeconomic determinants include: 3-month T-Bill rate and the Term slope. Bond-specific determinants include: Amount outstanding (Amount), Coupon, Years-to-maturity (number of years to the bond's maturity), Liquidity (number of monthly transactions for each bond) and Putability (Putable dummy). S&P return is the return of the S&P 500 index over the same quarter as the bond. Firm-specific accounting determinants include: Pre-tax interest coverage dummies D1 to D3 (D4 excluded by STATA due to collinearity), Operating income to sales, Market leverage, and Total debt to capitalization. Eleven monthly dummies are included in the regressions to control for seasonality but are not tabulated. OLS t-statistics appear in the parentheses. $^{+}$, *, ** and *** indicate significance at the 0.1, 0.05, 0.01 and 0.001 levels, respectively, based on the traditional critical t-values.

VARIABLES	Diff in relative	Political	The interaction of
Policy uncertainty	23.35***	43.72***	20.39**
	(3.69)	(6.20)	(3.19)
Ratings	10.41*	12.63**	10.09*
	(2.57)	(3.24)	(2.47)
Liquidity	-6.31***	-6.04***	-6.35***
	(-9.96)	(-9.66)	(-10.00)
S&P return	-13.11***	-13.20***	-13.10***
	(-28.71)	(-29.04)	(-28.59)
Operating income to sales	-6.51***	-6.06***	-6.58***
	(-9.47)	(-8.91)	(-9.52)
Market leverage	45.82***	42.16***	46.35***
	(25.07)	(22.71)	(25.18)
Total debt capitalization	-12.24***	-11.45***	-12.36***
	(-10.89)	(-10.55)	(-10.93)
Pre-Tax coverage D1	-22.94***	-21.41***	-23.16***
	(-3.62)	(-3.47)	(-3.64)
Pre-Tax coverage D2	-23.06***	-21.88***	-23.23***
	(-3.77)	(-3.68)	(-3.78)
Pre-Tax coverage D3	-25.80***	-24.98***	-25.92***
	(-4.48)	(-4.47)	(-4.48)
Closest benchmark treasury rate	-39.91***	-32.95***	-40.92***
	(-17.41)	(-13.23)	(-17.72)
Term Slope	-23.15***	-28.49***	-22.37***
	(-12.24)	(-14.11)	(-11.75)
coupon	1.88	1.46	1.95
	(0.72)	(0.58)	(0.74)
Years to maturity	-4.88**	-3.18+	-5.13**
	(-3.04)	(-1.89)	(-3.18)
Amount	8.90*	5.39	9.42*
	(2.35)	(1.46)	(2.47)
Dummy putable	64.72**	53.07*	66.42**
	(2.70)	(2.18)	(2.77)
Election dummy	52.91***	50.23***	53.30***
	(26.45)	(24.19)	(26.49)
Constant	166.43***	146.81***	169.28***
	(19.42)	(16.85)	(19.65)
Observations	76,901	76,901	76,901
Firm Fixed Effect	YES	YES	YES
Monthly Dummies	YES	YES	YES
Firm Clustering	YES	YES	YES

Table 3.12. Cross sectional heterogeneity

The table reports the results of the cross-sectional heterogeneity examination. Panel A reports our results for the investment irreversibility measures and Panel B reports our results for the dependence on government spending. A detailed description of the variables is given in appendix 1. In panel A, saleability, cyclicality and asset tangibility (PPE/AT) and their interactions with the PUI are included. DGS is the dependence on government spending, which is estimated using a Leontief approach. The election dummy is equal to 1 for the presidential election years. Macroeconomic determinants include: 3-month T-Bill rate and the Term slope. Bond-specific determinants include: Amount outstanding (Amount), Coupon, Years-to-maturity (number of years to the bond's maturity), Liquidity (number of monthly transactions for each bond) and Putability (Putable dummy). S&P return is the return of the S&P 500 index over the same quarter as the bond. Firm-specific accounting determinants include: Pre-tax interest coverage dummies D1 to D3 (D4 excluded by STATA due to collinearity), Operating income to sales, Market leverage, and Total debt to capitalization. Eleven monthly dummies are included in the regressions to control for seasonality but are not tabulated. OLS t-statistics appear in the parentheses. $^{+}$, *, ** and *** indicate significance at the 0.1, 0.05, 0.01 and 0.001 levels, respectively, based on the traditional critical t-values.

	(1)	(2)	(3)	(4)	(1)
VARIABLES			**Panel A**		**Panel B**
Saleability*PUI	0.01+				
	(1.90)				
Saleability	-0.00**				
	(-3.22)				
Cyclicality* PUI		14.86***			
		(12.07)			
Cyclicality		31.40***			
		(3.53)			
PPE/AT* PUI			3.13***		
			(3.75)		
PPE/AT			2.54*		
			(2.35)		
Cost Sunkness* PUI				3.93+	
				(1.69)	
Cost Sunkness				18.37***	
				(8.98)	
DGS* PUI					10.11***
					(5.45)
DGS					68.93***
					(10.84)
Rating	25.22***	24.89***	24.68***	16.33	35.30***
	(3.54)	(5.71)	(5.82)	(1.34)	(3.42)
Liquidity	-3.91***	-5.02***	-5.01***	-3.99**	-2.68*
	(-3.53)	(-7.75)	(-7.68)	(-2.60)	(-2.20)
S&P return	-13.08***	-12.47***	-12.70***	-13.59***	-11.90***
	(-17.70)	(-28.53)	(-28.79)	(-12.16)	(-15.03)
Operating income to sales	-5.81***	-7.06***	-7.17***	-7.30***	-3.96***
	(-5.25)	(-11.29)	(-11.21)	(-5.07)	(-3.31)
Market leverage	43.04***	45.58***	46.76***	42.54***	43.94***
	(22.88)	(37.71)	(38.53)	(14.93)	(20.49)
Total debt capitalization	-14.48***	-13.72***	-14.35***	-9.87***	-15.88***
	(-8.30)	(-12.89)	(-13.34)	(-3.60)	(-8.23)
Pre-Tax coverage D1	3.99	-17.16**	-20.00**	-24.75+	-0.58
	(0.45)	(-2.82)	(-3.26)	(-1.92)	(-0.06)
Pre-Tax coverage D2	1.84	-20.71***	-22.12***	-10.30	-4.09
	(0.22)	(-3.51)	(-3.74)	(-0.86)	(-0.49)
Pre-Tax coverage D3	3.55	-23.94***	-24.15***	-24.08*	4.34
	(0.47)	(-4.37)	(-4.41)	(-2.18)	(0.57)
Closest benchmark treasury rate	-33.38***	-28.80***	-32.00***	-27.84***	-48.98***
	(-16.49)	(-23.11)	(-25.76)	(-9.57)	(-19.61)
Term Slope	4.40**	4.14***	5.29***	7.77***	7.75***
	(3.27)	(4.71)	(5.88)	(3.48)	(4.49)
coupon	1.12	2.16	2.17	13.72*	-4.15
	(0.28)	(0.92)	(0.93)	(2.22)	(-0.87)
Years to maturity	16.70***	20.62***	19.71***	18.35***	8.81**
	(6.65)	(12.96)	(12.37)	(4.82)	(2.91)
Amount	-10.90*	-16.84***	-14.97***	-12.89*	8.12

	(-2.27)	(-5.69)	(-5.24)	(-2.00)	(1.34)
Dummy putable	-13.50	8.08	11.08	91.85+	-42.76
	(-0.39)	(0.36)	(0.51)	(1.95)	(-1.34)
Election dummy	13.98***	17.76***	17.75***	32.76***	-15.18***
	(5.23)	(10.66)	(10.60)	(7.94)	(-4.31)
Constant	120.43***	94.95***	121.00***	109.90***	191.06***
	(12.41)	(12.30)	(18.41)	(7.52)	(16.93)
Observations	41,611	106,629	105,210	17,374	32,352
Adjusted R-squared	0.25	0.28	0.27	0.28	0.30
Firm Fixed Effect	YES	YES	YES	YES	YES
Monthly Dummies	YES	YES	YES	YES	YES
Firm Clustering	YES	YES	YES	YES	YES

Table 3.13. Default Probability or Market Risk Premiums

This table studies whether policy uncertainty impacts credit spreads through its influence on firm-specific default probabilities or through increases in market-wide risk premiums captured through Bond-CDS spreads. Default probabilities are estimated using CDS data from Markit. A detailed description of the variables is given in appendix 1. The election dummy is equal to 1 for the presidential election years. Macroeconomic determinants include: 3-month T-Bill rate and the Term slope. Bond-specific determinants include: Amount outstanding (Amount), Coupon, Years-to-maturity (number of years to the bond's maturity), Liquidity (number of monthly transactions for each bond) and Putability (Putable dummy). S&P return is the return of the S&P 500 index over the same quarter as the bond. Firm-specific accounting determinants include: Pre-tax interest coverage dummies D1 to D3 (D4 excluded by STATA due to collinearity), Operating income to sales, Market leverage, and Total debt to capitalization. Eleven monthly dummies are included in the regressions to control for seasonality but are not tabulated. OLS t-statistics appear in the parentheses. $^{+}$, *, ** and *** indicate significance at the 0.1, 0.05, 0.01 and 0.001 levels, respectively, based on the traditional critical t-values.

	(1)	(2)	(3)	(4)
VARIABLES	Default probability	CDS-bond basis	Default probability	CDS-bond basis
Policy uncertainty	32.50***	34.96***	4.20***	18.52***
	(31.70)	(34.86)	(4.73)	(16.83)
Rating			16.76***	20.90***
			(3.58)	(3.66)
Liquidity			1.71*	-3.25***
			(2.44)	(-3.91)
S&P return			11.03***	-13.09***
			(26.12)	(-23.70)
Operating income to sales			-4.74***	-6.37***
			(-5.55)	(-9.43)
Market leverage			37.48***	29.86***
			(29.55)	(18.02)
Total debt capitalization			-7.25***	-10.59***
			(-6.67)	(-7.85)
Pre-Tax coverage D1			-2.64	-14.91*
			(-0.47)	(-2.00)
Pre-Tax coverage D2			-12.39*	-22.64**
			(-2.39)	(-3.18)
Pre-Tax coverage D3			-17.45***	-26.30***
			(-3.72)	(-4.06)
Closest benchmark treasury rate			-10.04***	-14.20***
			(-7.73)	(-9.54)
Term Slope			40.42***	3.56***
			(44.97)	(3.66)
Coupon			-0.41	3.79
			(-0.19)	(1.24)
Years to maturity			10.56***	10.02***
			(7.37)	(5.37)
Amount			-17.63***	-16.05***
			(-6.95)	(-4.14)
Dummy putable			-5.35	20.57
			(-0.38)	(0.64)
Election dummy			-4.05*	19.12***
			(-2.00)	(10.23)
Constant	-7.40***	11.37***	32.02***	71.48***
	(-12.02)	(15.44)	(5.06)	(8.73)
Observations	99,679	99,493	70,686	70,468
Adjusted R-squared	0.14	0.25	0.40	0.37
Firm Fixed Effect	YES	YES	YES	YES
Monthly Dummies	YES	YES	YES	YES
Firm Clustering	YES	YES	YES	YES

Table 3.14. Alternative measures of policy uncertainty

This table reports fixed effects regression estimates of the credit spreads (dependent variable) on alternative measures of policy uncertainty. Alternative "monetary" measures of policy uncertainty included in this table are unanticipated consumer credit, M1 growth and unanticipated inflation. Other variables include the fiscal alternatives; namely, real GDP growth, fluctuations in terms of trade, government surplus/deficit, public service to GDP and government consumption to GDP. Variables are described in Appendix I. $^{+}$, *, ** and *** indicate significance at the 0.1, 0.05, 0.01 and 0.001 levels, respectively, based on the traditional critical t-values.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Policy uncertainty	25.18***	24.22***	26.51***	24.43***	20.30***	22.58***	24.13***	25.14***	27.21***
	(30.32)	(28.95)	(31.32)	(29.45)	(24.87)	(28.84)	(28.55)	(30.20)	(23.24)
Ratings	27.22***	26.09***	27.86***	27.19***	28.70***	29.77***	27.26***	25.67***	27.58***
	(6.54)	(6.29)	(6.67)	(6.55)	(6.84)	(7.09)	(6.56)	(6.40)	(6.79)
Liquidity	-4.53***	-4.68***	-4.55***	-4.59***	-4.53***	-4.17***	-4.56***	-4.14***	-3.61***
	(-7.16)	(-7.46)	(-7.28)	(-7.31)	(-7.26)	(-6.88)	(-7.28)	(-6.83)	(-6.13)
S&P return	-11.75***	-11.69***	-11.99***	-11.86***	-6.85***	-13.51***	-11.52***	-10.85***	-9.50***
	(-28.19)	(-27.73)	(-28.51)	(-27.73)	(-16.46)	(-34.15)	(-27.24)	(-26.35)	(-26.26)
Operating income to sales	-6.46***	-6.42***	-6.37***	-6.47***	-6.11***	-5.63***	-6.48***	-6.48***	-5.47***
	(-10.69)	(-10.68)	(-10.57)	(-10.70)	(-10.36)	(-9.79)	(-10.71)	(-10.99)	(-9.66)
Market leverage	42.82***	42.66***	42.12***	42.72***	39.51***	34.68***	42.08***	39.44***	31.96***
	(35.48)	(35.81)	(35.44)	(35.76)	(33.33)	(29.79)	(35.20)	(33.95)	(27.96)
Total debt capitalization	-13.38***	-13.13***	-13.29***	-13.34***	-12.65***	-11.39***	-13.16***	-12.24***	-10.12***
	(-13.03)	(-12.87)	(-13.01)	(-13.05)	(-12.49)	(-11.60)	(-12.91)	(-12.49)	(-10.82)
Pre-Tax coverage D1	-11.16+	-11.09+	-11.20+	-10.97+	-11.84*	-13.91*	-10.38+	-10.87+	-13.16*
	(-1.89)	(-1.88)	(-1.89)	(-1.86)	(-2.03)	(-2.38)	(-1.76)	(-1.91)	(-2.39)
Pre-Tax coverage D2	-14.71*	-14.75*	-14.80*	-14.57*	-14.92**	-16.13**	-14.18*	-14.43**	-15.58**
	(-2.56)	(-2.57)	(-2.57)	(-2.53)	(-2.64)	(-2.83)	(-2.47)	(-2.61)	(-2.90)
Pre-Tax coverage D3	-19.09***	-19.46***	-19.00***	-19.07***	-19.29***	-18.65***	-18.99***	-18.79***	-18.32***
	(-3.60)	(-3.68)	(-3.58)	(-3.60)	(-3.68)	(-3.53)	(-3.59)	(-3.67)	(-3.68)
Closest treasury rate	-21.48***	-20.29***	-23.42***	-20.89***	-18.17***	-10.55***	-21.95***	-20.33***	-13.23***
	(-16.51)	(-16.08)	(-18.48)	(-16.73)	(-14.77)	(-8.71)	(-17.69)	(-17.19)	(-10.89)
Term Slope	1.74	-1.82+	2.95**	0.96	6.31***	4.56***	0.90	-2.38**	3.66***
	(1.63)	(-1.78)	(3.29)	(1.19)	(7.33)	(5.35)	(1.12)	(-3.09)	(3.30)
Coupon	1.85	1.77	1.90	1.82	1.64	1.27	1.87	1.60	1.24
	(0.82)	(0.79)	(0.86)	(0.81)	(0.73)	(0.58)	(0.83)	(0.73)	(0.59)
Years to maturity	22.04***	22.45***	17.46***	21.80***	19.12***	11.34***	22.14***	21.48***	14.57***
	(14.25)	(14.54)	(10.35)	(14.00)	(12.57)	(7.69)	(14.22)	(14.39)	(9.25)
Amount	-20.28***	-21.44***	-14.91***	-20.44***	-18.63***	-12.31***	-20.39***	-18.68***	-11.53***
	(-7.02)	(-7.34)	(-4.99)	(-7.09)	(-6.60)	(-4.58)	(-7.08)	(-6.70)	(-4.06)
Dummy putable	-10.08	-11.60	-0.27	-10.17	-7.80	-3.91	-9.40	-10.68	-7.17
	(-0.45)	(-0.52)	(-0.01)	(-0.46)	(-0.35)	(-0.18)	(-0.42)	(-0.48)	(-0.33)
Election dummy	16.24***	20.40***	-0.62	16.43***	21.15***	25.45***	15.72***	18.95***	19.49***
	(8.46)	(11.61)	(-0.20)	(10.04)	(12.53)	(13.84)	(9.68)	(11.76)	(6.38)
Government surplus/ deficit	1.28								-1.51
	(0.85)								(-1.07)
Government consumption to		5.32***							2.69**
		(4.15)							(2.72)
Public service to GDP			-11.70***						-6.32***
			(-6.01)						(-4.73)
M1 growth				2.12***					0.41
				(5.71)					(1.28)
Fluctuations in terms of trade					18.56***				19.40***
					(25.64)				(28.62)
Real GDP growth						30.61***			24.27***
						(36.97)			(38.71)
Unanticipated inflation							-6.78***		-8.80***
							(-23.94)		(-31.61)
Unanticipated consumer credit								-18.57***	-15.72***
								(-40.01)	(-39.96)
Constant	84.16***	79.90***	91.89***	81.91***	75.88***	56.99***	84.91***	89.49***	75.67***
	(12.86)	(12.57)	(14.42)	(12.85)	(12.04)	(9.05)	(13.37)	(14.63)	(12.40)
Observations	111,573	111,573	111,573	111,573	111,573	111,573	111,573	111,573	111,573
Adjusted R-squared	0.29	0.29	0.29	0.29	0.31	0.34	0.29	0.31	0.37
Firm Fixed Effect	YES	YES	YES	YES	YES	YES	YES	YES	YES
Monthly Dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm Clustering	YES	YES	YES	YES	YES	YES	YES	YES	YES

Table 4.1. Credit-rating changes by year for eight samples

This table reports the descriptive statistics in two panels for eight clean samples. Panel A reports the number of credit-rating changes (N. Chg), average change in notches (Mean Chg.) and relative percentage share of the credit rating changes (% of Sample) for firms for which S&P reported a downgrade or upgrade over the period of 2002-2012. Panels A1 and A2 report results for the universe of downgraded and upgraded firms while panels A3 and A4 report results for the financially downgraded and upgraded firms, respectively. Panel B reports similar information for downgrades and upgrades based on the implied changes in the distance-to-default obtained by using our KMV-like DTD model. A financially downgraded or upgraded firm is one whose rating change is for firms that received high-yield loans (HYL) with interest expenses of over 200 bps above the Libor rate. The size of a credit-rating downgrade is -1, for example, if an issuer is downgraded from an A- to a BBB+ rating, and is -2 if the downgrade is from an A- to a BBB rating.

Panel A: S&P credit-rating changes

	A1: All downgrades			A2: All upgrades			A3: HYL downgrades			A4: HYL upgrades		
Rating Year	**N. Chg**	**Mean Chg.**	**% of Sample**	**N. Chg**	**Mean Chg.**	**% of Sample**	**N. Chg**	**Mean Chg.**	**% of Sample**	**N. Chg**	**Mean Chg.**	**% of Sample**
2002	58	-6.8	7.54	17	6	2.82	12	-5.6	8.39	6	3.8	4.48
2003	50	-8.1	6.50	27	4.7	4.49	15	-9	10.49	8	9.8	5.97
2004	41	-6.4	5.33	31	7.4	5.15	8	-9	5.59	13	9	9.70
2005	53	-6.9	6.89	37	8.1	6.15	9	-14.8	6.29	9	8	6.72
2006	44	-6.6	5.72	48	7	7.97	8	-9.5	5.59	5	3.3	3.73
2007	65	-6.4	8.45	57	5.6	9.47	9	-7.4	6.29	7	11.3	5.22
2008	68	-6	8.84	44	5	7.31	18	-6.2	12.59	4	3	2.99
2009	126	-7.5	16.38	42	8.9	6.98	16	-11.3	11.19	12	4.1	8.96
2010	45	-5.8	5.85	97	7.6	16.11	11	-4.7	7.69	23	13	17.16
2011	49	-5.8	6.37	107	6.7	17.77	21	-4.2	14.69	24	6.6	17.91
2012	68	-6.6	8.84	95	4.5	15.78	16	-7.7	11.19	23	4.7	17.16
N.	667			602			143			134		

Panel B: Model-implied credit-rating changes

	B1: All downgrades			B2: All upgrades			B3: HYL downgrades			B4: HYL upgrades		
Rating Year	**N. Chg**	**Mean Chg.**	**% of Sample**	**N. Chg**	**Mean Chg.**	**% of Sample**	**N. Chg**	**Mean Chg.**	**% of Sample**	**N. Chg**	**Mean Chg.**	**% of Sample**
2002	38	-4.8	3.28	25	5.6	3.92	4	-3.3	1.52	6	4.4	1.07
2003	170	-6.7	14.93	88	6.3	7.94	4	-1	1.53	34	5.8	6.09
2004	84	-7.6	7.37	119	7.1	10.74	7	-3.2	2.72	22	10.5	3.94
2005	393	-7.2	34.50	353	7.5	31.86	28	-5.3	10.89	134	7.3	24.01
2006	119	-6.5	10.45	162	6.1	14.62	27	-6.8	10.51	66	6.3	11.83
2007	64	-9.1	5.62	102	6.4	9.21	10	-5.3	3.89	41	9.1	7.35
2008	68	-10.9	5.97	92	6.5	8.30	14	-5.8	5.45	36	13.2	6.45
2009	60	-15.2	5.27	22	8	1.99	17	-14.9	6.61	42	14.5	7.53
2010	56	-14.7	4.92	47	8.6	4.24	35	-5.3	13.62	37	8.8	6.63
2011	50	-8.7	4.39	74	9	6.68	58	-5.1	22.57	47	6.7	8.42
2012	58	-14.9	5.09	43	11.8	3.88	60	-6.5	23.35	97	8.1	17.38
N.	1160			1127			264			562		

Table 4.2. Number of firms in various notch-change credit-rating categories

This table reports the number of firms in various notch-change credit-rating categories for our eight samples based on the credit-rating after the change. Panel A reports the number of credit-rating upgrades (N. Chg) for each category of number of notches (N. Notch) changed by S&P and implied by our KMV-like DTD model. Panel B reports the same information for credit-rating upgrades. A financially (fin.) downgraded or upgraded firm has high-yield loans (HYL) with interest expenses of over 200 bps above the Libor rate. The size of a credit-rating downgrade is -1, for example, if an issuer is downgraded from an A to A- rating, and is -2 if the downgrade is from an A to a BBB+ rating.

	Panel A: Rating Downgrades						Panel B: Rating Upgrades				
		By S&P		Using DTD				By S&P		Using DTD	
S&P	N. Notch	All N. Chg.	Fin. N. Chg.	All N. Chg.	Fin. N. Chg.	S&P	N. Notch	All N. Chg.	Fin. N. Chg.	All N. Chg.	Fin. N. Chg.
	-1	43		52	3		1	65	1	108	13
	-2	7	4	13			2	9		46	6
	-3	1		12			3	4		48	5
	-4			4			4	1		42	2
A	-5					A	5	2		27	4
	-6:-10						+6:+10	5	3	21	11
	-11:-15						+11:+15			1	6
	-16:-20						+16:+20			1	3
	>-20						>+20				1
	-1	399	95	483	150		1	420	96	520	268
	-2	79	10	192	36		2	46	12	160	86
	-3	13	1	78	5		3	9	2	56	41
B	-4	4	1	36	6	B	4	6	2	16	14
	-5	4		23	3		5	5	2	9	11
	-6:-10	2		26	9		+6:+10	16	9	18	18
	-11:-15			9	5		+11:+15	7	3	14	3
	-1	19	2	44	15		+16:-+0	1			
	-2	21	7	28	6		1	1		30	35
	-3	6	3	17	1		2	2	4	6	10
C	-4	2		14			3	1		2	9
	-5			12			4			1	8
	-6:-10	1		8		C	5				5
	-11:-15						+6:+10	1		1	3
	-1			21	14		+11:+15				
	-2	3		14	2		+16:+20				
	-3	15	5	13	4		>+20				
D	-4	5	1	10	2						
	-5	12	3	8	1						
	-6:-10	30	11	19	4						
	-11:-23	1		24							
Total		667	143	1160	264	Total		602	134	1127	562

Table 4.3. Two financial-performance ratios for the firms in the HYL sample around their loan deals

This table reports the ratios of cash flows to interest expenses and book value of debt to total capital for the downgraded sample of firms with high-yield loan (HYL) originations for the prior year (t=-1) and year of the HYL deal (t=0) for various credit-rating categories. Cash flow is measured using Earnings before Interest, Taxes, Depreciation and Amortization. IG and SPEC refer to "investment grade" and "speculative grade" credit-rating categories, respectively. A (i.e., AAA, AA & A), B (i.e., BBB, BB & B), C (CCC, CC & C) and D (Default) refer to S&P credit-rating categories. "All" refers to the undifferentiated total sample of credit-rating downgrades by S&P.

		EBITDA / Interest Expenses		**Book value of debt/ Total Capital**	
Rating Class	**Statistic**	**Pre (t_{-1})**	**Post (t_0)**	**Pre (t_{-1})**	**Post (t_0)**
IG	Median	7.56%	3.35%	0.47	0.59
	Mean	13.24%	9.50%	0.52	0.42
SPEC	Median	2.42%	1.75%	0.53	0.70
	Mean	6.03%	3.51%	0.72	0.71
A	Median	37.82%	16.56%	0.37	0.29
	Mean	34.42%	20.57%	0.37	0.35
B	Median	4.34%	3.37%	0.49	0.60
	Mean	8.61%	3.40%	0.51	0.67
C	Median	1.66%	0.73%	0.57	0.95
	Mean	1.97%	0.11%	1.06	0.97
D	Median	1.01%	0.49%	0.79	0.99
	Mean	2.72%	1.39%	0.92	0.67
All HYL	Median	3.43%	2.39%	0.61	0.68
	Mean	5.17%	2.41%	0.67	0.70

Table 4.4. Potential contributors to the financial credit deterioration costs of credit-rating downgrades by S&P

This table provides the relative contributions to the costs of credit-rating deteriorations (CCRD) of issuers from three potential sources for the downgraded HYL sample for two categories (investment grade or IG and speculative or SPEC), the specific credit-rating classes of A, B, C and D, and the undifferentiated sample of credit-rating downgrades (All). IG includes issuers with bond ratings of BBB or higher, and SPEC includes issuers with speculative bond ratings of BB to D inclusive. Based on Asquith, Gertner, and Scharfstein (1994), the potential sources of CCRD are industry, leverage or issuer (non-leverage) performances. The contribution to CCRD due to each factor is calculated as the cash shortfall due to that factor divided by the sum of the cash shortfall due to all the factors. As in Asquith, Gertner, and Scharfstein (1994) and Andrade and Kaplan (1998), the cash shortfall due to industry performance is the ratio of EBITDA to Interest Expense if the issuer maintained the same performance as its industry median for the event year and its industry median ratio of EBITDA to Sales for the year before the credit-rating downgrade. The cash shortfall due to the issuer performance effect is measured by calculating the changes in the issuer's cash flows if the issuer had the same ratio of EBITDA to Sales as during the event year (t=0). The cash shortfall due to the leverage effect is the change in its cash flows if the ratio of EBITDA to Interest Expenses remained unchanged from its value one year before the event year (t=-1).

		Portion of CCRD due to		
Credit Rating Class	**Statistic**	**Industry performance**	**Leverage**	**Issuer performance**
IG	Median	5.12%	30.41%	52.27%
	Mean	32.95%	16.82%	36.74%
SPEC	Median	1.35%	69.37%	33.72%
	Mean	-2.83%	66.67%	29.05%
A	Median	49.83%	28.65%	-18.25%
	Mean	50.72%	-10.91%	-84.80%
B	Median	-3.00%	63.65%	39.41%
	Mean	-3.48%	65.83%	33.42%
C	Median	0.57%	55.82%	43.90%
	Mean	16.08%	60.68%	23.95%
D	Median	1.80%	55.05%	40.98%
	Mean	-1.14%	46.75%	39.23%
All	Median	-1.77%	58.36%	29.43%
	Mean	1.09%	64.61%	35.75%

Table 4.5. Estimates of changes in capital values associated with S&P credit-rating changes

This table reports estimates of the changes in firm value associated with credit-rating changes (ΔCR) by S&P from 2002 to 2012 for two samples: total sample (All) of downgraded and upgraded firms in panels A and B, respectively; and a sample of HYL downgraded and upgraded firms in panels C and D, respectively. The HYL sample includes firms that received high yield loans with interest expenses of over 200 bps above the Libor rate and consequently were downgraded or upgraded. The total capital value (TCV in millions of dollars), costs or benefits in % of the credit-rating value change (CCRD or BCRU), and the normalized (norm.) cost or benefit from the credit-rating change are reported in the panels. CCRD and BCRU are market-adjusted ($M\text{-}adj.$) and industry-adjusted ($Ind\text{-}adj.$) for the year of the credit-rating change and for the following year. t = -1, 0 and 1 refer to the year prior to, the year of, and year after the credit-rating change, respectively. N is the number of observations. Each market-adjusted value for CCRD and BCRU is given by $(TCV_{-1} - M\text{-}adj.\ TCV_t)/TCV_{-1}$. The market-adjusted TCV ($M\text{-}adj.\ TCV_t$) is calculated by first discounting TCV to year t = -1 from t = 0 and from t = 1 by the corresponding CRSP value-weighted index consisting of all NYSE, NASDAQ and AMEX listed stocks for each year. Each industry-adjusted value is calculated by discounting TCV by the return on an equally weighted portfolio from the stocks in the same SIC industry category. Normalized CCRD and BCRU are obtained by dividing their respective values at t=0, 1 by the weighted-average numbers of notches of the CR change in each category. The Student's t test and the Wilcoxon-Mann-Whitney U test are used to examine the significance of the mean and median, respectively. *, ** and *** indicate significance at the 0.10, 0.05 and 0.01 levels, respectively.

Panel A: All sample of firms downgraded by S&P

			Total capital value					% CCRD, t=-1 to				% Norm. CCRD, t=-1 to			
Sample	**N**	**Stat**	**Pre-ΔCR**	**M-adj.**		**Ind-adj.**		**M-adj.**		**Ind-adj.**		**M-adj.**		**Ind-adj.**	
			t=-1	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**
IG	251	**Median**	4361	4091	4054	4193	4457	-6.2	-7.2*	-3.6**	2.3*	-4.1	-5.9*	-3**	1.9*
		Mean	15372	14008	14586	14729	16364	-8.9	-5.1	-4.3***	6.5***	-7.3	-4.2	-3.5***	5.3***
SPEC	350	**Median**	854	777	721	806	709	-9.6**	-14.8***	-7.7*	-16.7***	-6.5**	-9.1***	-4.7*	-10.2***
		Mean	3694	3315	2240	3600	3338	-10.7*	-39.4*	-2.9	-9.5	-6.6*	-24.2*	-1.8	-5.8
A	51	**Median**	7173	7089	7331	7526	7419	-1.2	2.3	4.9***	3.3**	-1	2	4.2***	2.8**
		Mean	26227	28018	25371	27202	26897	6.8	-3.3	3.7	2.5	5.8	-2.8	3.1	2.1
B	501	**Median**	1869	1683	1712	1743	1697	-10.2	-8.5***	-6.3	-9.2	-7.9	-6.6***	-4.9	-7.1
		Mean	6696	5793	7035	5690	5981	-13.4	4.9*	-15.1***	-10.6**	-10.4	3.8*	-11.7***	-8.2**
C	49	**Median**	371	289	309	311	317	-19.5***	-15.6***	-16.3***	-13.3***	-10.2***	-8.1***	-8.5***	-6.9***
		Mean	1255	1075	1092	1165	727	-14.7*	-13.1**	-6.9*	-42.9	-7.7*	-6.8**	-3.6*	-22.4
Default	66	**Median**	429	330	285	354	363	-27.1***	-35.8***	-20.5***	-17.6***	-5.2***	-6.9***	-3.9***	-3.4***
		Mean	875	646	479	593	655	-26.1*	-45.3***	-34.4*	-26.5***	-5*	-8.7***	-6.6*	-5.1***
All	667	**Median**	1514	1338	1266	1360	1325	-11.6***	-16.2***	-10.9**	-13.6**	-6.8***	-9.5***	-6.4**	-7.9***
		Mean	7765	6440	7045	6622	5814	-17.1*	-9.5**	-14.8***	-25.1**	-10*	-5.5**	-8.6***	-14.6**

Panel B: All sample of firms upgraded by S&P

				Total capital value				% BCRU, t=-1 to				% Norm. BCRU, t=-1 to			
			Pre-ΔCR	M-adj.		Ind-adj.		M-adj.		Ind-adj.		M-adj.		Ind-adj.	
Sample	**N**	**Stat**	**t=-1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**
IG	253	**Median**	4297	4514	4434	4576	4817	4.6	3.2	6.1*	12.0***	3.1	2.2	4.1*	8.1***
		Mean	10014	10451	10472	11547	10236	4.2***	4.6***	15.3***	2.1***	2.8***	3.1***	10.3***	1.4***
SPEC	349	**Median**	912	971	881	948	968	5.2	-2.5	4.6**	6.1*	4.2	-2	3.7**	5*
		Mean	2532	2824	2447	2621	2734	11.6	-3.7	3.1*	7.2*	9.4	-3	2.5*	5.9*
A	86	**Median**	6625	7479	7161	7330	7532	12.9	7.8	10.5**	13.4*	7.4	4.5	6**	7.7*
		Mean	16776	18240	18116	18627	19197	8.7**	7.9***	11.0***	14.4***	5**	4.5***	6.3***	8.3***
B	510	**Median**	1483	1522	1459	1599	1599	3.3	-2.1	7.4**	6.8**	2	-1.3	4.6**	4.2**
		Mean	4227	4507	4371	4454	4564	6.4*	3.6*	5.5***	7.6***	4*	2.2*	3.4***	4.7***
C	6	**Median**	254	254	263	278	252	2.4	-3.1	2.6	-6.9	2.1	-2.8	2.3	-6.2
		Mean	1562	1618	1515	1335	1422	2.5	-3.3	-14.6	-8.9	2.2	-3	-13.1	-8
All	602	**Median**	1749	1837	1894	1925	1945	5.0*	8.7*	9.3**	10.6**	3*	5.3*	5.6**	6.4**
		Mean	5946	6257	6578	7054	6624	4.9***	10.7***	18.4***	11.2***	3***	6.5***	11.2***	6.8***

Panel C: HYL sample of firms downgraded by S&P

				Total capital value				% CCRD, t=-1 to				% Norm. CCRD, t=-1 to			
			Pre-ΔCR	M-adj.		Ind-adj.		M-adj.		Ind-adj.		M-adj.		Ind-adj.	
Sample	**N**	**Stat**	**t=-1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**
IG	11	**Median**	3670	3466	3377	3582	3416	-5.7	-8.8	-4.30*	-7.2	-7.1	-6.2	-3*	-5.1
		Mean	5183	4877	4685	5227	4614	-6.1	-9.8	2.2	-10.4	-4.3	-6.9	1.5	-7.3
SPEC	112	**Median**	691	502	508	549	559	-23.00**	-25.00**	-17.70*	-19.10*	-14.8**	-16.1**	-11.4*	-12.3*
		Mean	3371	2963	3000	2632	4075	-11.80**	-11.60*	-22.8	21	-7.6**	-7.5*	-14.7	13.5
A	4	**Median**	19954	19287	19103	18880	19643	-3	-4.2	-6.01	-2.2	-1.5	-2.1	-3	-1.1
		Mean	19843	20503	18714	18754	18991	4.04	-6.7	-4.8	-2.8	2	-3.4	-2.4	-1.4
B	107	**Median**	835	786	780	787	797	-10.80**	-13.2	-8.90*	-9.3	-9.5**	-11.6	-7.8*	-8.2
		Mean	3977	3754	3567	3858	3581	-5.1	-9.80*	-2.5	-9.7	-4.5	-8.6*	-2.2	-8.5
C	12	**Median**	479	368	382	369	379	-22.80***	-19.30*	-24.00*	-20.03	-10.9***	-9.3*	-11.5*	-9.6
		Mean	984	642	770	740	1116	-36.50*	-22.30**	-22.80*	15.4	-17.5*	-10.7**	-10.9*	7.4
Default	20	**Median**	333	222	205	259	238	-33.20***	-39.10***	-22.90**	-29.90*	-6.3***	-7.4***	-4.3**	-5.6*
		Mean	382	219	237	259	290	-43.20**	-37.80**	-32.00*	-23.00*	-8.2**	-7.1**	-6*	-4.3
All	143	**Median**	629	507	493	539	517	-19.60**	-21.50***	-15.60*	-18.4	-10.7**	-11.8***	-8.5*	-10.1
		Mean	3196	2578	2589	2797	2641	-19.70**	-19.20**	-12.6	-17.2	-10.8**	-10.5**	-6.9	-9.4

Panel D: HYL sample of firms upgraded by S&P

				Total capital value				% BCRU, t=-1 to				% Norm. BCRU, t=-1 to			
			Pre-ΔCR	M-adj.		Ind-adj.		M-adj.		Ind-adj.		M-adj.		Ind-adj.	
Sample	**N**	**Stat**	**t=-1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**
IG	36	**Median**	3441	3641	3653	3685	3599	5.60*	6.40*	6.7	4.3	1.4*	1.6*	1.7	1.1*
		Mean	12507	13458	12579	13579	15409	7.6	0.5	8.50*	23.1	1.9	0.1	2.1*	5.7
SPEC	98	**Median**	872	906	849	907	890	4.9	-2.3	4.7	3.2	2.7	-1.3	2.6	1.8
		Mean	2067	2214	2042	2101	2168	6.4	-1.7	2	4.32	3.5	-0.9	1.1	2.4
A	4	**Median**	4126	4441	4591	4589	4539	7.5	10.90*	11.40**	9.80*	1.1	1.6*	1.7**	1.5*
		Mean	21872	24192	24792	27027	24409	10.60*	13.3	23.60*	11.6	1.6*	2	3.5*	1.7
B	126	**Median**	1071	1045	1133	1123	1091	-3.3	5.22	4.80*	2.3	-1.8	2.9	2.6*	1.3
		Mean	3796	3964	4027	3930	3957	4.3	5.9	3.30*	4.10*	2.4	3.2	1.8*	2.2*
C	4	**Median**	401	359	327	382	382	-10.1	-16.2	-8.07	-6.3	-5.1	-8.1	-4	-3.2
		Mean	987	826	898	921	963	-15.6	-9.2	-6.5	-3.3	-7.8	-4.6	-3.3	-1.7
All	134	**Median**	1164	1205	1137	1233	1247	4.3	-2.09	5.00*	6.31*	2.2	-1.1	2.5*	3.2*
		Mean	4117	4369	3989	4304	4274	6.2	-3.2	4.3	3.7	3.1	-1.6	2.2	1.9

Table 4.6. Determinants of the costs (benefits) to firm value of credit downgrades and upgrades

This table reports the OLS regression results for a set of firm-specific variables on the costs (benefits) of credit-rating deteriorations (improvements) for samples of downgraded and upgraded firms whose credit-rating changes are primarily attributed to economic factors (Economic) and to financial factors (Financial) where the Economic samples consist of firms with high-yield loans (HYL). These variables are mostly selected from Parsons and Titman (2009) that have been identified as determinants of corporate capital structure. The list also includes the magnitude of credit rating changes (first determinant), which is measured by the number of notches of credit-rating change in response to a credit event (i.e., S&P downgrade or upgrade). All estimations account for clustered standard errors across time. Variable construction and definitions are explained in Appendix B: variable description. +, *, ** and *** indicate significance at the 0.10, 0.05, 0.01 and 0.001 levels, respectively.

	Downgraded Samples		**Upgraded Samples**	
	Economic	**Financial**	**Economic**	**Financial**
Credit Rating Changes	6.41***	10.41***	2.23***	5.8***
	(8.34)	(9.34)	(4.22)	(8.82)
Market Leverage	5.37***	6.37***	5.67***	4.61***
	(8.23)	(7.23)	4.81	(12.17)
Market to Book	11.80***	9.8***	5.76	5.06***
	(5.43)	(9.43)	(1.28)	(9.64)
Log (Sales)	6.72+	4.72	3.30+	7.49
	(1.66)	(0.34)	(1.77)	(0.19)
CF Volatility	9.22***	14.22**	3.01**	6.8***
	(3.69)	(2.69)	(2.65)	(6.42)
Profitability	-5.63	-1.63	-9.08	-4.03
	(-0.2)	(-1.2)	(-1.19)	(-0.10)
Tangibility	-2.56*	-1.56*	-4.77**	-0.08*
	(-1.75)	(-2.25)	(-2.69)	(-1.75)
Dividend Payer	5.54*	8.54+	1.83*	3.97
	(1.49)	(1.50)	(-2.25)	(1.5)
Tax rate	-0.06	0.94	-4.06	3.21
	(-0.86)	(1.14)	(-0.96)	(-0.21)
Idiosyncratic Volatility	-10.9**	-6.9	-13.9***	-3.54
	(-3.01)	(-1.01)	(-4.01)	(-0.44)
Inflation Rate	-4.68+	-5.68*	-9.68	-7.35
	(1.77)	(-1.82)	(-0.23)	(-0.04)
GDP growth	5.01	8.01	1.01	0.28+
	(0.03)	(0.42)	(0.97)	(1.70)
Industry Fixed Effects	YES	YES	YES	YES
Clustered SE	YES	YES	YES	YES
Adi-R^2	0.39	0.43	0.19	0.29
N. Observations	670	143	601	134

Table 4.7. Event study results

This table reports the event study results for credit-rating downgrades in the left panel and for credit-rating upgrades in the right panel. The event window starts from 12 quarters before the event (either upgrade or downgrade) and ends 12 quarters after the event. The first column in each panel indicates the event date. The average control-adjusted returns (ACAR) are reported in the second and fourth columns of each panel for the sample with all credit-rating changes and the sample with all credit-rating changes of more than one notch. Their respective cumulated values (CACAR) are reported in the third and fifth columns of each panel. The number of notches associated with each credit-rating upgrade or downgrade is denoted by x so that x>0 includes all credit-rating upgrades or downgrades in respectively the left and right panels, while x>1 only includes the credit-rating upgrades or downgrades of more than one notch downgrades respectively in the left and right panels. The control or benchmark used is a propensity-score matched sample that has no high yield loans. T-values are reported in the parentheses based on standard errors that are robust to time clustering. +, *, ** and *** indicate significance at the 0.10, 0.05, 0.01 and 0.001 levels, respectively.

Left Panel: Downgrades					**Right Panel: Upgrades**				
Relative Time	ACAR x>0	CACAR x>0	ACAR x>1	CACAR x>1	Relative Time	ACAR x>0	CACAR x>0	ACAR x>1	CACAR x>1
-12	-0.040	-0.040	-0.090	-0.090	-12	-0.030	-0.030	-0.070	-0.070
-11	0.030	-0.010	-0.010	-0.100	-11	0.021	-0.009	0.011*	-0.070
-10	-0.009	-0.019	-0.099	-0.199*	-10	-0.010	-0.019	-0.050*	-0.120
-9	0.022*	0.003	0.042	-0.157*	-9	0.036**	0.017**	0.016*	-0.120
-8	0.006	0.009	0.036*	-0.121*	-8	0.003	0.020	0.013**	-0.107
-7	-0.015**	-0.006*	0.015	-0.106	-7	-0.010	0.010	0.040	-0.067
-6	0.030	0.024	0.020	-0.086	-6	0.001	0.011	0.031	-0.036
-5	-0.030	-0.006	0.000	-0.086	-5	-0.002*	0.009	0.038	0.002
-4	0.013*	0.007	0.023	-0.063	-4	0.013*	0.022*	-0.027	-0.025
-3	0.002	0.009	-0.058*	-0.120*	-3	-0.006	0.016	0.014	-0.011
-2	-0.007**	0.002*	-0.057*	-0.178**	-2	0.007	0.023	0.017	0.006
-1	-0.027	-0.024	0.003	-0.174	-1	-0.027	-0.004	0.023*	0.029
0	-0.055***	-0.079***	-0.075***	-0.249***	0	0.032**	0.028**	0.072***	0.101***
1	0.002	-0.077***	-0.018*	-0.267***	1	0.002**	0.03***	-0.008	0.093**
2	-0.017**	-0.094***	-0.127*	-0.394***	2	0.0170	0.047***	0.057**	0.150***
3	-0.010	-0.104***	0.000	-0.394***	3	-0.010	0.037**	0.010*	0.160***
4	-0.011	-0.115***	-0.011	-0.405***	4	-0.011	0.026**	-0.001	0.159***
5	0.010	-0.105**	0.030	-0.375***	5	0.010*	0.036**	0.050	0.209***
6	-0.025*	-0.130***	-0.135	-0.510***	6	0.012	0.048**	-0.018	0.191***
7	-0.020	-0.150***	-0.030*	-0.540***	7	-0.015	0.033*	-0.035	0.156***
8	0.010	-0.140***	-0.050	-0.590***	8	0.009	0.042**	0.009*	0.165***
9	0.010	-0.130***	0.000	-0.590***	9	0.012*	0.054***	0.022	0.187***
10	0.000	-0.130***	-0.030	-0.620***	10	-0.009	0.045***	-0.009	0.178***
11	0.002	-0.128***	-0.108	-0.728***	11	0.002	0.047***	-0.018	0.160***
12	0.010	-0.118***	-0.110	-0.838***	12	0.095	0.142***	0.105	0.265***
No. Firms	460		202			478		110	

Table 4.8. Determinants of the costs to firm value after credit-rating downgrades

Regression results are reported in this table for the determinants of the costs of credit-rating downgrades. The dependent variable is the cumulative cost to firm value over the first eight quarters after a credit-rating downgrade. Determinants are drawn primarily from those identified in the capital structure literature. See Appendix B for their definitions and construction. The number of notches associated with each credit-rating downgrade is denoted by x so that x>0 includes all credit-rating downgrades while x>1 only includes the credit-rating downgrades of more than one notch. The control or benchmark used to calculate the costs of credit-rating downgrades is a propensity-score matched sample that has no high yield loans. The included industry fixed effect is based on the first two digits of a company's SIC code. T-values are reported in the parentheses based on standard errors that are robust to time clustering. +, *, ** and *** indicate significance at the 0.10, 0.05, 0.01 and 0.001 levels, respectively.

	Financial		Economic	
	x>0	x>1	x>0	x>1
Credit Rating Changes	6.41***	5.58***	1.58***	2.92***
	(4.34)	(4.31)	(7.65)	(4.31)
Market Leverage	4.37***	4.57**	-0.76***	-0.75
	(5.23)	(4.69)	(4.02)	(1.36)
Market to Book	5.70***	7.03***	4.36***	3.7***
	(15.66)	(15.66)	(14.32)	(14.32)
Log (Sales)	-4.72	-6.72+	-11.38*	-6.72
	(0.45)	(-1.78)	(2.21)	(-0.78)
CF Volatility	4.22	2.22	2.88	4.22*
	(0.69)	(1.35)	(-1.31)	(-1.97)
Profitability	-7.63	-6.29***	-8.29***	-7.63***
	(-1.20)	(-3.86)	(-3.86)	(-3.86)
Tangibility	-4.56	-7.89	-7.22***	-6.56***
	(-0.75)	(-0.75)	(-4.08)	(-6.08)
Dividend Payer	3.54	1.54	-0.87	0.20*
	(1.51)	(-0.84)	(-0.01)	(-1.84)
Tax rate	-2.06	-4.72**	-2.06***	0.6***
	(1.14)	(-3.14)	(-6.47)	(-4.47)
Idio. Volatility	5.9*	4.56*	3.23*	3.23+
	(2.06)	(2.06)	(2.06)	(-1.94)
Inflation Rate	0.32	-0.20	-0.24	1.02
	1.51	(-1.04)	1.09	0.43
GDP growth	2.01	0.76	0.68	0.23
	1.03	1.23	0.01	1.42
Industry Fixed Effects	YES	YES	YES	YES
Clustered SE	YES	YES	YES	YES
Adj-R^2	0.32	0.35	0.21	0.22
N. Observations	1280	398	5980	1844

Table 4.9. Determinants of the benefits to firm value after credit-rating improvements

Regression results are reported in this table for the determinants of the benefits of credit-rating upgrades. The dependent variable is the cumulative benefit to firm value over the first eight quarters after a credit-rating upgrade. Determinants are drawn primarily from those identified in the capital structure literature. See Appendix B for their definitions and construction. The number of notches associated with each credit-rating upgrade is denoted by x so that x>0 includes all credit-rating upgrades while x>1 only includes the credit-rating upgrades of more than one notch. The control or benchmark used to calculate the costs of credit-rating upgrades is a propensity-score matched sample that has no high yield loans. The included industry fixed effect is based on the first two digits of a company's SIC code. T-values are reported in the parentheses based on standard errors that are robust to time clustering. +, *, ** and *** indicate significance at the 0.10, 0.05, 0.01 and 0.001 levels, respectively.

	Financial		Economic	
	x>0	x>1	x>0	x>1
Credit Ratings	0.96	2.89*	0.03	0.26*
	(0.11)	(2.44)	(0.32)	(-2.33)
Market Leverage	0.02*	0.17	0.40**	1.77***
	(2.30)	(0.07)	(2.71)	(9.51)
Market to Book	0.14**	0.93**	0.28***	-0.13
	(2.78)	(2.87)	(2.67)	(-1.02)
Log (Sales)	0.08*	2.23*	0.17**	0.09
	(2.24)	(1.14)	(2.47)	(1.37)
CF Volatility	-0.53	-0.97	-0.27	0.32
	(-0.15)	(-0.94)	(-1.74)	(0.76)
Profitability	0.31*	1.14**	0.11**	0.01*
	(2.14)	(3.42)	(2.93)	(2.32)
Tangibility	-0.06	-1.59	-0.25*	-0.02
	(-0.51)	(-1.57)	(-2.53)	(-0.25)
Dividend Payer	-0.14*	-0.09	0.05	0.71*
	(-2.41)	(-0.18)	(0.23)	(1.96)
Tax rate	0.07+	1.06+	0.44	0.09
	(-1.87)	(-1.79)	(0.11)	(0.81)
Idio. Volatility	0.03	-0.26	-1.08**	-0.32
	-0.82	(-1.06)	(-2.62)	(-0.91)
Inflation Rate	-0.02	-1.77	-0.02	0.05
	(-0.30)	(-1.05)	(-0.29)	(0.65)
GDP growth	0.76**	1.55+	0.25*	0.21+
	(2.77)	(1.68)	(2.41)	(1.62)
Industry Fixed Effects	YES	YES	YES	YES
Clustered SE	YES	YES	YES	YES
Adj-R^2	0.15	0.15	0.11	0.12
N. Observations	1200	330	5398	1030

Table 4.10. Estimates of changes in capital values associated with implied credit-rating changes

This table reports estimates of the changes in capital values associated with credit-rating changes from 2002 to 2012 implied by our structural distance-to-default model for two samples: total sample (All) of downgraded and upgraded firms in panels A and B, respectively; and a sample of "financially" downgraded and upgraded firms (the HYL sample) in panels C and D. The HYL sample includes firms that received high yield loans with interest expenses of over 200 bps above the Libor rate and consequently were downgraded or upgraded. Panels report the total capital value (TCVin millions of dollars), costs or benefits in % of the credit-rating change (CCRD or BCRU), and the average cost or benefit from the credit-rating change. CCRD and BCRU are market-adjusted ($M\text{-}adj.$) and industry-adjusted ($Ind - adj.$) for the year of the credit-rating change and for the following year. t = -1, 0 and 1 refer to the year prior to, the year of, and year after the credit-rating change, respectively. N is the number of observations. Each market-adjusted value for CCRD and BCRU is $(TCV_{-1} - M\text{-}adj.\ TCV_t)/TCV_{-1}$. The market adjusted TCV ($M\text{-}adj.\ TCV_t$) is calculated by first discounting TCV to year t = -1 from t = 0 and t = 1 by the corresponding CRSP value-weighted index consisting of all NYSE, NASDAQ and AMEX listed stocks for each year. Similarly, each industry-adjusted value is calculated by discounting TCV by the return of an equally weighted portfolio of the stocks in the same SIC industry category. The Student's t test and the Wilcoxon-Mann-Whitney U test are used to examine the significance of the mean and median, respectively. *, ** and *** indicate significance at the 0.10, 0.05 and 0.01 levels, respectively.

Panel A: All sample of implied firm downgrades

			Pre-Credit	Total capital value (million $)				%CCRD from t=-1 to			
			Chg.	M-adj.		Ind-adj.		M-adj.		Ind-adj.	
Sample	**N**	**Stat**	**t=-1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**
IG	504	**Median**	2456	2409	2383	2389	2449	-2.2	-3.6	-3.6	-1.3
		Mean	10651	10161	11037	9943	10885	-4.9	3.7	-6.4	2.3
SPEC	656	**Median**	762	730	705	746	736	-4.4***	-7.6	-5.3*	-6.1
		Mean	2584	2705	1927	2476	2430	5.3	-26.6*	-4.6	-6.9
A	109	**Median**	6951	7371	6822	6851	6742	5.6	-1.7	-1.1	-3.4
		Mean	15208	14948	14776	14983	14720	-1.9	-2.7	-1.5	-3.4
B	847	**Median**	1632	1725	1751	1603	1603	4.5*	5.9	-3.4	-1.0
		Mean	1995	1991	2056	2058	1706	0.6	3.3	3.0	-13.4
C	123	**Median**	459	370	391	374	372	-14.9*	-15.2*	-12.8**	-17.3*
		Mean	1412	1443	987	1342	1192	4.3	-31.9	-5.3*	-14.1
Default	81	**Median**	365	344	288	307	337	-10.4**	-16.9**	-8.1***	-6.4*
		Mean	735	710	499	731	553	-5.6*	-29.2*	-4.3	-23.2
All	1160	**Median**	1499	1414	1409	1405	1406	-4.3**	-7.1*	-5.0*	-6.3
		Mean	3874	4125	3372	4012	4033	6.2	-13.2	4.3	3.7

Panel B: All sample of implied firm upgrades

				Total capital value (million $)				% BCRU from t=-1 to			
			Pre-Credit	M-adj.		Ind-adj.		M-adj.		Ind-adj.	
Sample	**N**	**Stat**	**Chg. t=-1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**
IG	162	**Median**	3702	3680	3715	3753	3795	-0.4	0.5	1.5*	2.1*
		Mean	12589	12446	12276	13198	13034	-1.1**	-2.3*	4.7*	3.3
SPEC	965	**Median**	1025	1077	1037	1060	1014	2.1*	-1.5	3.2	0.3
		Mean	5004	4931	4878	4701	5084	-1.4	-2.3	-6.6	1.1
A	40	**Median**	8571	8963	8840	8807	9205	4.6*	3.3**	3.1	7.2
		Mean	15447	16858	15209	16282	16584	9.3**	-1.7*	5.2**	7.2*
B	793	**Median**	2630	2715	2702	2704	2602	2.3	3.1	3.1*	-0.4
		Mean	6549	5072	5677	7408	6134	-22.7*	-13.3	12.8**	-6.8
C	294	**Median**	631	623	681	586	710	2.9	5.3	-10.4	7.6
		Mean	1428	1330	1525	1036	1295	-7.2	4.9	-28.3	-10.2
All	1127	**Median**	1946	1986	1961	1980	1896	1.1	0.2	2.0*	-2.5
		Mean	5022	4859	5106	5185	5193	-3.8	2.1***	3.4*	3.9

Panel C: HYL sample of implied firm downgrades

				Total capital value (million $)				% CCRD from t=-1 to			
			Pre-Credit	M-adj.		Ind-adj.		M-adj.		Ind-adj.	
Sample	**N**	**Stat**	**Chg. t=-1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**
IG	31	**Median**	2138	2020	2204	2193	2096	-5.3	2.1	3.0	-1.5
		Mean	4961	3936	5129	4812	5035	-20.7	3.3	-3.1	1.2
SPEC	207	**Median**	1093	1029	846	947	928	-6.1*	-23.4**	-12.3*	-14.1
		Mean	4088	4272	1748	3568	3702	4.5	-56.9	-12.8	-9.3
A	3	**Median**	14602	14123	14019	15037	14240	-3.4*	-4.0	3.1	-2.5
		Mean	15604	16087	14871	17995	15249	3.0	-4.8	15.2	-2.3
B	213	**Median**	1561	1600	1691	1574	1602	2.8*	8.9*	-0.1	3.3
		Mean	3529	3148	3424	3991	3607	-10.3	-2.5	12.8	1.7
C	22	**Median**	854	526	550	639	931	-38.1	-34.9*	-27.4	8.1
		Mean	977	820	1217	715	746	-14.6*	22.8*	-28.3	-23.3
Default	26	**Median**	562	492	435	313	533	-9.3*	-22.9**	-42.8*	-5.3
		Mean	587	499	417	560	571	-12.3**	-32.2*	-3.5*	-0.9
All	264	**Median**	784	701	750	792	756	-12.7*	-3.4**	3.1*	-3.2
		Mean	4652	4792	4053	4175	4310	2.9	-12.6	-10.4	-7.6

Panel D: HYL sample of implied firm upgrades

			Pre-Credit	Total capital value (million $)				% BCRU from t=-1			
				M-adj.		Ind-adj.		M-adj.		Ind-adj.	
Sample	**N**	**Stat**	**Chg. t=-1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**
IG	221	**Median**	2256	2282	2306	2193	2342	1.4	2.6	-3.4*	4.3*
		Mean	8825	9650	8585	8867	8662	9.4	-2.5*	0.4*	-1.7
SPEC	341	**Median**	1421	1538	1357	1471	1471	7.1	-5.0	2.3	3.1
		Mean	2014	2152	1537	2184	2277	6.4	-22.8	8.3	13.3
A	51	**Median**	14231	14450	14536	13903	14978	1.5*	2.1**	-2.2	5.3
		Mean	14693	14380	15127	19615	15354	-2.3	2.9	33.4	4.5
B	441	**Median**	1748	1815	1587	1785	1810	3.4	-8.5	3.1	3.1
		Mean	3662	3597	3574	3581	3841	-1.7	-2.5	-2.6	4.8
C	70	**Median**	725	750	625	695	647	3.1	-14.0	-3.3	-10.4
		Mean	985	1115	929	1019	1056	13.5	-7.7	4.3	8.3*
All	562	**Median**	1264	1343	1298	1240	1306	5.3	2.9	-3.1*	4.7**
		Mean	5425	5675	5341	5599	5615	4.9	-1.2	3.4	3.4

Table 4.11. Control for business risk

This table reports the result of the financial costs (benefits) of credit deterioration (improvement) controlling for business risk. To do so, the HYL sample is split into two sub-samples (high and low business risk) sing the relative measure of the business risk variable as computed in Aivazian, Booth, and Cleary (2003). Reported in this table are estimates of the changes in firm values associated with credit-rating changes (ΔCR) by S&P from 2002 to 2012 for a sample of HYL downgraded and upgraded firms. The HYL sample includes firms that received high yield loans with interest expenses of over 200 bps above the Libor rate and consequently were downgraded or upgraded. The total capital value (TCV in millions of dollars), costs or benefits in % of the credit-rating value changes (CCRD or BCRU), and the normalized (norm.) costs or benefits from the credit-rating changes are reported in the panels. CCRD and BCRU are market-adjusted ($M\text{-}adj.$) and industry-adjusted ($Ind\text{-}adj.$) for the year of the credit-rating change and for the following year. t = -1, 0 and 1 refer to the year prior to, the year of, and year after the credit-rating change, respectively. N is the number of observations. Each market-adjusted value for CCRD and BCRU is given by $(TCV_{-1} - M\text{-}adj.\ TCV_t)/TCV_{-1}$. The market-adjusted TCV ($M\text{-}adj.\ TCV_t$) is calculated by first discounting TCV to year t = -1 from t = 0 and from t = 1 by the corresponding CRSP value-weighted index consisting of all NYSE, NASDAQ and AMEX listed stocks for each year. Each industry-adjusted value is calculated by discounting TCV by the return on an equally weighted portfolio from the stocks from the same SIC industry category. Normalized CCRD and BCRU are obtained by dividing their respective values at t=0, 1 by the weighted-average numbers of notches of the CR change in each category. The Student's t test and the Wilcoxon-Mann-Whitney U test are used to examine the significance of the mean and median, respectively. *, ** and *** indicate significance at the 0.10, 0.05 and 0.01 levels, respectively.

Sample	N	Stat	Total capital value					% CCRD, t=-1 to t=(0,1) High Business Risk				% CCRD, t=-1 to t=(0,1) Low Business Risk				(a) High Business Risk less Low Business Risk			
			Pre-ΔCR	M-adj.		Ind-adj.		M-adj.		Ind-adj.		M-adj.		Ind-adj.		M-adj.		Ind-adj.	
			t=-1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
IG	251	Median	4361	4091	4054	4193	4457	-6.2	-7.2*	-3.6**	2.3*	-5.1	-5.9*	-3**	1.9*	-1.1	-1.3	-0.6	0.4
		Mean	15372	14008	14586	14729	16364	-8.9	-5.1	-4.3***	6.5***	-7.3	-4.2	-3.5***	5.3***	-1.6*	-0.9	-0.8	1.2
SPEC	350	Median	854	777	721	806	709	-9.6**	-14.8***	-7.7*	-16.7***	-5.9**	-9.1***	-4.7*	-10.2***	-3.7*	-5.7**	-3	-6.5**
		Mean	3694	3315	2240	3600	3338	-10.7*	-39.4*	-2.9	-9.5	-6.6*	-24.2*	-1.8	-5.8	-4.1*	-15.2**	-1.1	-3.7
A	51	Median	7173	7089	7331	7526	7419	-1.2	2.3	4.9***	3.3**	-1	2	4.2***	2.8**	-0.2	0.3	0.7	0.5
		Mean	26227	28018	25371	27202	26897	6.8	-3.3	3.7	2.5	5.8	-2.8	3.1	2.1	1	-0.5	0.6	0.4
B	501	Median	1869	1683	1712	1743	1697	-10.2	-8.5***	-6.3	-9.2	-7.9	-6.6***	-4.9	-7.1	-2.3*	-1.9*	-1.4*	-2.1
		Mean	6696	5793	7035	5690	5981	-13.4	4.9*	-15.1***	-10.6**	-10.4	3.8*	-11.7***	-8.2**	-3*	1.1	-3.4*	-2.4
C	49	Median	371	289	309	311	317	-19.5***	-15.6***	-16.3***	-13.3***	-10.2***	-8.1***	-8.5***	-6.9***	-9.3**	-7.5**	-7.8**	-6.4**
		Mean	1255	1075	1092	1165	727	-14.7*	-13.1**	-6.9*	-42.9	-7.7*	-6.8**	-3.6*	-22.4	-7	-6.3**	-3.3	-20.5***
Default	66	Median	429	330	285	354	363	-27.1***	-35.8***	-20.5***	-17.6***	-5.2***	-6.9***	-3.9***	-3.4***	-21.9***	-28.9***	-16.6***	-14.2***
		Mean	875	646	479	593	655	-26.1*	-45.3***	-34.4*	-26.5***	-5*	-8.7***	-6.6*	-5.1***	-21.1***	-36.6***	-27.8***	-21.4***
All	667	Median	1514	1338	1266	1360	1325	-11.6***	-16.2***	-10.9**	-13.6**	-6.8***	-9.5***	-6.4**	-7.9***	-4.8*	-6.7**	-4.5*	-5.7*
		Mean	7765	6440	7045	6622	5814	-17.1*	-9.5**	-14.8***	-25.1**	-10*	-5.5**	-8.6***	-14.6**	-7.1**	-4*	-6.2*	-10.5***

Figures

Figure 2.1. Creditor rights index for various countries

This graph shows the median HHI debt-type heterogeneity index for firms in various countries. Higher levels of the index indicate more debt-type heterogeneity (i.e. concentration on fewer debt types).

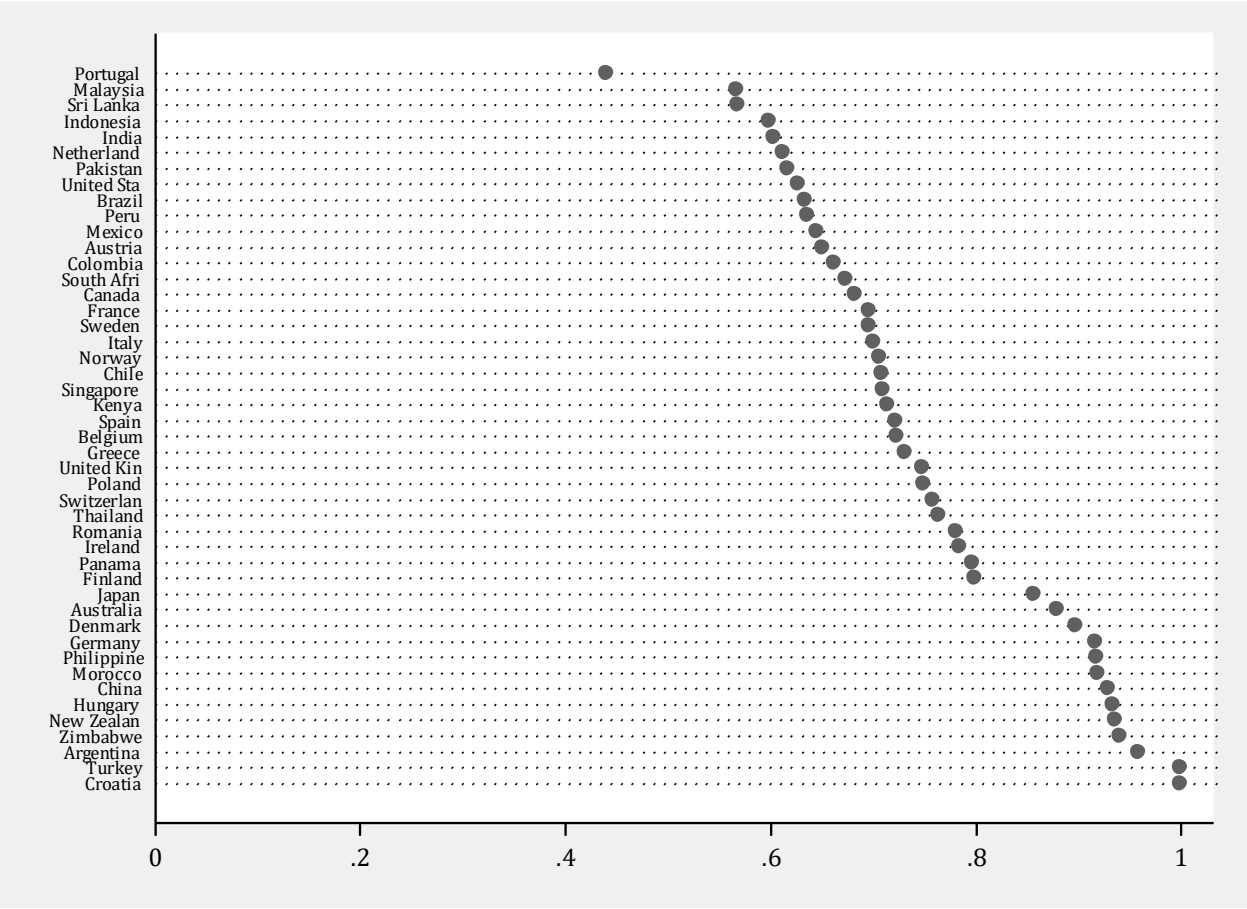


Figure 2.2. Fitted relation between debt-type heterogeneity and creditor rights index

This graph provides primary evidence for the relation between the strength of creditor rights and debt-type heterogeneity. Each dot in the graph represents country-averaged values for debt-type heterogeneity as proxied by a normalized Herfindahl-Hirschman index where 0 is the lowest Heterogeneity and 1 is the highest. Construction of this creditor rights index is explained in detail in Appendix 1.

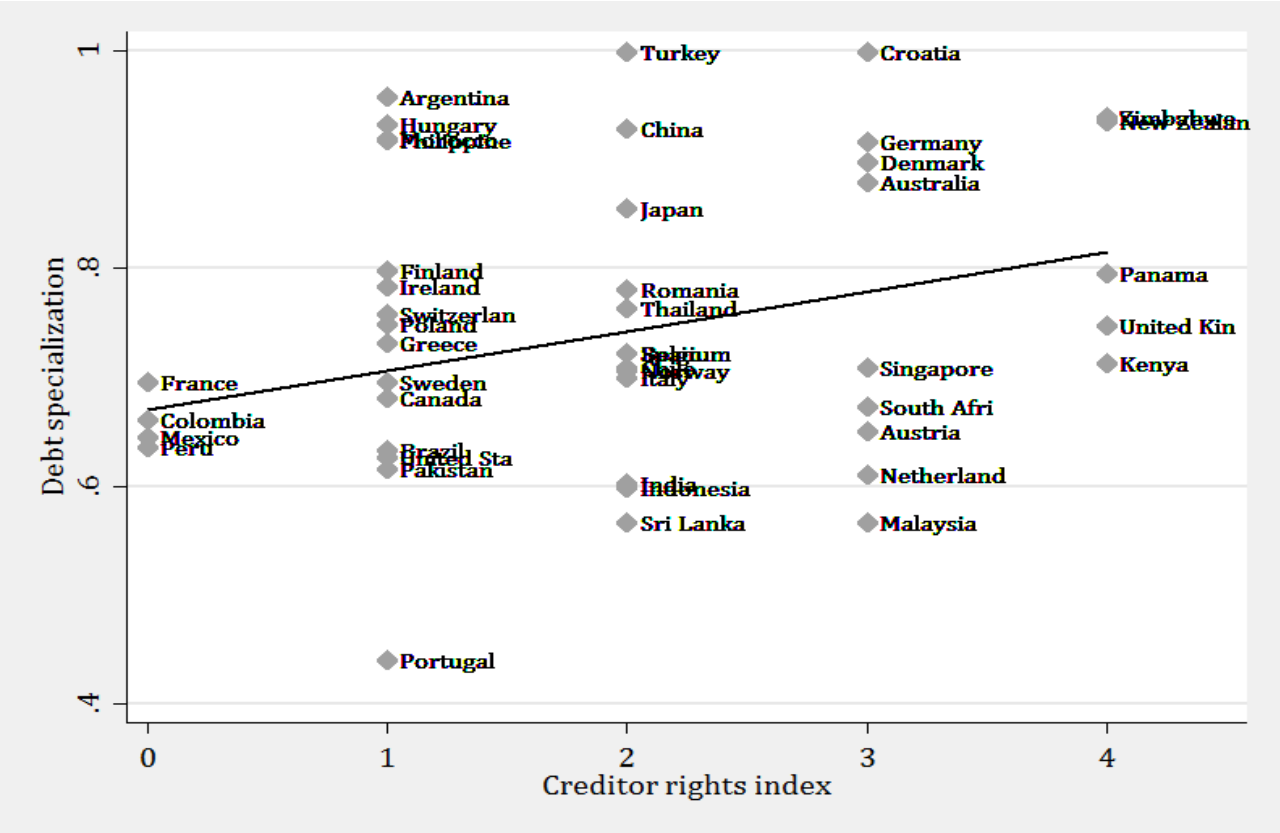
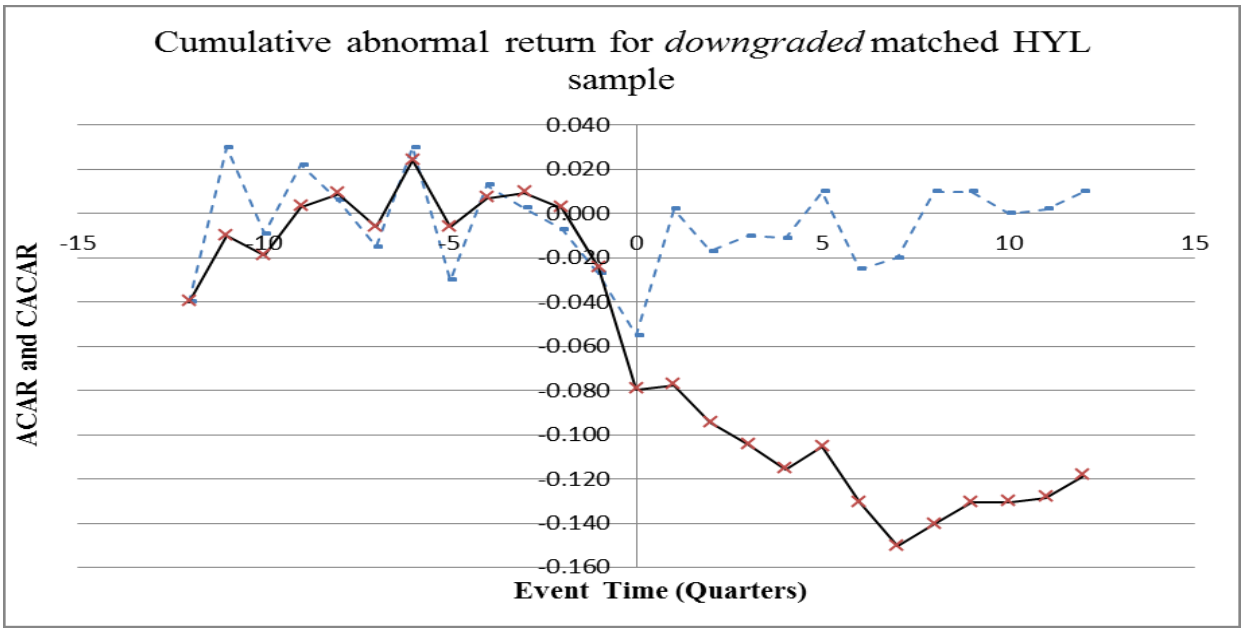


Figure 4.1. (Cumulative) Average Control-adjusted Returns for Credit Downgrades and Upgrades for the HYL Sample

This figure plots the average control-adjusted returns (ACAR) represented by the dotted lines and cumulative average control-adjusted returns (CACAR) represented by the solid lines based on the firm value changes around credit-rating changes for the HYL sample. Downgrades and upgrades are depicted in the upper and lower panels, respectively. The event windows are from quarter 12 before each credit event up to and including quarter 12 after the credit event (i.e., downgrade or upgrade).

Panel A- Downgraded sample



Panel B- Upgraded sample

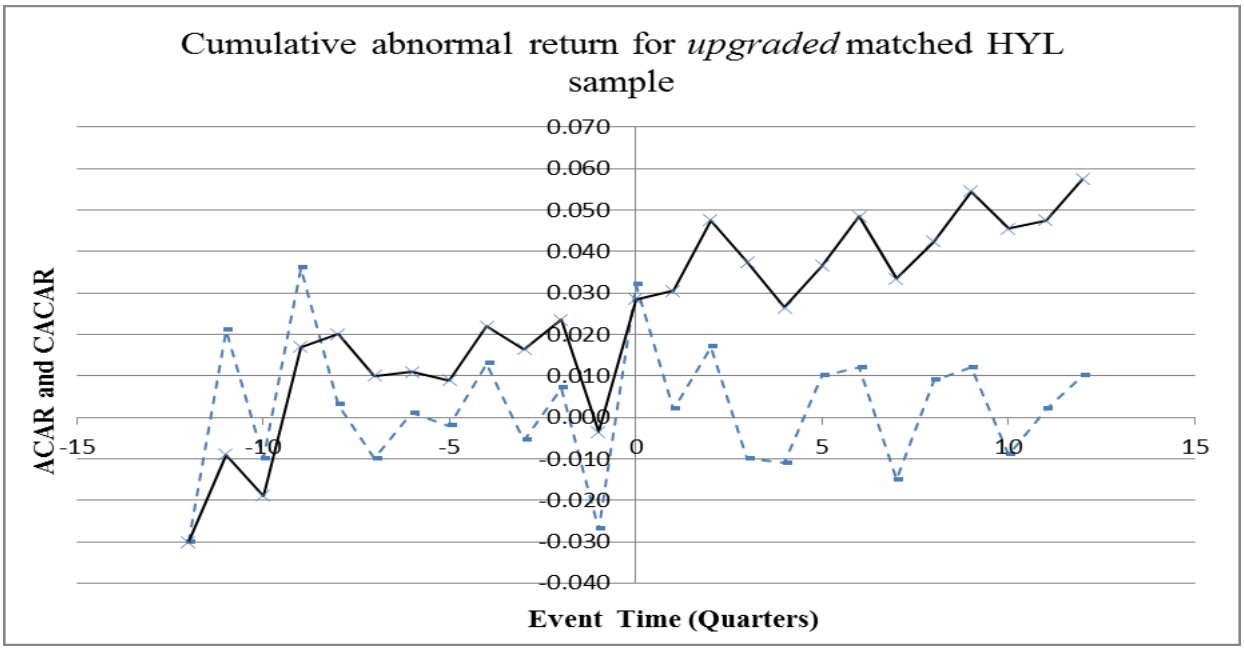
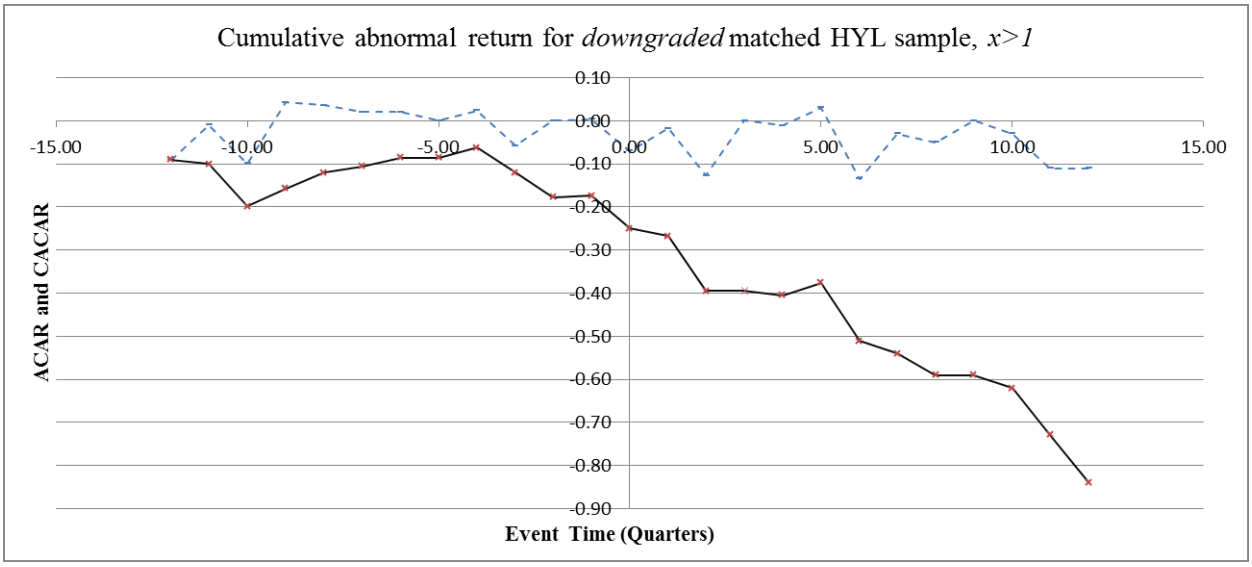


Figure 4.2. (Cumulative) Average Control-adjusted Returns for Credit Downgrades and Upgrades Greater than One Notch for the HYL Sample

This figure plots the average control-adjusted returns (ACAR) represented by the dotted lines and cumulative average control-adjusted returns (CACAR) represented by the solid lines based on the firm value changes around credit rating changes of more than one notch for the HYL sample. Credit rating deteriorations are reported in the upper panel and credit rating upgrades in the lower panel. The event windows are from quarter 12 before each credit event up to and including quarter 12 after the credit event (i.e., downgrade or upgrade).

Panel A- Downgraded sample



Panel B- Upgraded sample