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Master Thesis

Systematic Risk and Secured Debt

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Abstract

Unsecured debt has gained little attention in the academic literature. The existing literature considers all debt as secured. However, firms use different types of debt in different situations. Thus, the different debt instruments are important for firms' corporate policy decisions in the presence of financial constraints. In this paper, we investigate the relation between firms' choice of debt and the investments undertaken. We will show that firms with lower costs of financing can invest more. Our research is based on data concerning capital structures of U.S. public manufacturing firms, gathered in the period of 1996-2012.

Our results show that unsecured is cheaper than secured debt. Greater access to unsecured debt will therefore lead to more investments. When the access to unsecured debt is restricted, firms substitute toward secured debt and reduce their investments. Our results also show that lower spreads are not caused by the volatility of collateral, suggesting that collateral is not the key element to finance investments. We will therefore conclude that creditworthiness is more important than collateral, as creditworthiness gives access to the unsecured debt market.

Key words: Debt structure, unsecured debt, investments, financial constraints, collateral, creditworthiness.

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1. Introduction

Modigliani and Miller (1958) state that debt and capital structure decisions of firms are irrelevant under perfect capital markets. However, this is not the case in practice. Firms use different types of debt in different situations. Therefore, access and usage of the different debt instruments may have a large impact on firms' corporate policy decisions in the presence of financial constraints. Investments undertaken by a firm are thus affected by the firm's choice of debt. As a result, it is reasonable to think that firms with lower costs of financing can invest more.

We are going to investigate the capital structure of U.S. public manufacturing firms, with emphasis on aspects connected to a firm's debt and the impact on the firm's investment. Biguri (2015) analyses how access to the unsecured debt market affect investments. She introduces the topic by stating that firms' access to external funding may be limited by financial constraints, which reduces the firm's investment capacity. These financial constraints can be in the form of asymmetric information or contract enforceability. A way to reduce such friction is by pledging collateral. Collateral can be defined as the assets the borrower pledges to the lender in case of default. A firm's debt capacity will therefore be increased by pledging collateral. In addition, collateral reduces the risk for debt providers since collateral creates enforcement and protection against other creditors' claims.

The lender can liquidate the assets pledged as collateral if the borrower runs into default. A significant difference between secured and unsecured debt is that collateral is not applied when borrowing unsecured. Instead, when borrowing unsecured, factors such as creditworthiness of the firm is emphasized. Although it may sound counter-intuitive, unsecured debt is associated with less risky borrowers. Borrowers of secured debt are riskier and must pledge collateral to guarantee their repayments.

There is also a distinction in priority between the two debt forms in the event of default. As the lenders of secured debt have required collateral pledged, they will get their claims back first as they liquidate the assets used as collateral. Then, if there are more assets left to liquidate, the unsecured lenders will get their claims. In other words, the unsecured creditors are not guaranteed a payback. Therefore, they are exposed to a higher risk when lending out unsecured debt. Biguri (2015)

build on existing work by Berger and Udell (1990) and Federal Reserve (1993), and argue that unsecured debt is cheaper than secured debt. Firms that borrow unsecured debt minimize their financing costs and are thus able to invest more. However, when access to unsecured debt becomes more restricted, firms substitute toward secured debt, and hence the investments are reduced.

2. Literature review

Unsecured debt is a topic that has not gained much attention in the academic literature. The literature that exists today, considers all debt as being secured. However, it is shown that unsecured debt plays a major role in the debt market. By looking into firms' capital structures, researchers have explored the characteristics of the firms' choices of debt. Rauh and Sufi (2010) investigates the capital structure of U.S. public firms, and tries to assess what determines corporate capital structure. The study provides new information concerning capital structure decisions by acknowledging that firms use various types, sources and priorities of debt. In the study, the authors use a dataset that contains the type, source, and priority of every balance-sheet debt instrument for a large representative of rated public firms. The authors show why differentiating between secured and unsecured debt is important, regarding all types of debt markets. An important conclusion of these studies is that spread in the debt priority structure is a result of a decreasing credit quality situation. This importance is evident in other studies and is further described in terms of magnitude. If the debt structure is relevant, then the debt structure should have an impact on the investment as shown in Biguri (2015). Unsecured debt occurs in a larger extent than secured and is evident in the U.S. markets of bank debt, private placements and bonds. The paper researches a firm's investment magnitude if it has access to the unsecured debt market. The author tries to answer this question by investigating how shocks to unsecured debt influence investment decisions in the presence of financial constraints. As the results showed, investments are larger when access to unsecured debt increases. However, when there is a lack of access to unsecured debt, firms substitute towards secured debt. Because of the cost-effectiveness of unsecured debt, investments decrease when this substitution takes place. Despite what has been claimed in the literature, the findings of Biguri (2015) suggests that creditworthiness is a more important element to investments than collateral.

Let us now get a glance of the existing knowledge on pricing of debt. We begin with the present knowledge within bank debt expressed by the relationship between collateral and credit risk. Berger and Udell (1990) once questioned if unsecured debt is cheaper than secured. They do so by looking at three types of risk. The three types of risks are distinguished by risk of the borrower, the loan and the bank. This resulted in an interesting finding in the relationship between collateral and the three types of risk. The relationship was positive, for all three. Firms that are riskier than the average, tend to have secured debt, while unsecured loans tend to be associated with less risky firms. Hence, the banks with a large fraction of secured loans, have risky portfolios. Additionally, banks are able to collect information about the risk of the borrowers and hence they make high-risk borrowers pledge collateral. Berger and Udell (1990) therefore make evidence for that collateral is associated with riskier loans, borrowers and banks. Let's consider the situation for private placements. Federal Reserve (1993) examines the private placement market, a source of long-term funds. Such debt and equity securities are not under the regulation of the Securities and Exchange Commission (SEC). As these securities are not publicly offered, information about them is hard to find and hence exempted from regulation of SEC. Federal Reserve (1993) investigates the function of privately placed debt in corporate finance, and the relation to other debt markets. When dealing with privately placed debt, there are at least two common misperceptions. The first misunderstanding is that private placed debt replaces public bonds. The lenders correspond to the buyers of the public bonds and the issuer tries to avoid the costs relating to SEC registration. However, since the information about the borrower is limited, the lender must conduct credit-analysis on the debtor. This information gathering is especially important if the borrower is a smaller and less known actor, without access to the markets where the public bonds are traded. The public bond markets often serve the large companies and the information available is usually enough to monitor the markets. Therefore, the lenders have many similarities with banks and small resemblance with the buyers of publicly issued corporate debt. The second misunderstanding is that the private placement market cannot be distinguished from the bank loan market. Federal Reserve (1993) has found that there are differences in information-intensive lending. A highlighted determinant of the markets in which the company borrows and of the terms under which credit is available, is the degree of the information problem that a borrower poses for lenders.

In addition to bank debt and private placements, we can refer to the situation for bonds, researched in John et al. (2003). The paper provides insight on the relationship between the yield on a bond and it's collateral. The relationship is revealed through a study where they look at the difference in the yields of secured and unsecured respectively, while taken credit rating into account. The conclusion of the study is that the yield is higher for the collateralized bonds than for those which are not secured. The yield in this context is a measure of risk which stems from factors like probability of default, volatility of the collateral and other factors connected to loans. As a conclusion for the pricing of debt, these papers show that unsecured debt is cheaper than secured debt.

As we are interested in the mechanism of how the risks, such as value and volatility of the collateral impact the investment, this section will look at the collateral and the implications of macroeconomic forces. Banks estimate a recovery rate on their debt instruments and collateral pledged. Degryse et al. (2016) assess the effects of laws and institutions on the banks' expectations. They use data from sixteen non-U.S. countries. Their conclusion is that the recovery rates are higher, the higher the creditor rights are. In the cases where the collateral was exposed to agency problems, depreciated fast and was less redeployable, then the recovery rates were lower and more sensitive to institutions and laws. To compensate for the low recovery rates in economies with low performance, the banks will charge higher interest rates. The demand for collateralizable assets is a central cost of financing in many models regarding financial constraints. Liberti and Mian (2010) investigate how the collateral cost of capital is impacted by the degree of financial development. In their studies, the authors use 15 different countries which varies widely in financial and institutional development. They find that the countries that are more developed financially make it easier to borrow by lowering the collateral spread, which can be described as the difference in the collateralization rates between borrowers with high and low risk. Hence, the mixture of acceptable collateral will shift towards assets that are specific for each firm. On the other side, the share of non-specific assets in the mixture increases with borrower risk. This effect is less significant for more financially developed countries. Therefore, riskier firms in financially developed countries may borrow on different terms than riskier firms in less developed countries.

When looking at what the firms pledge as collateral, we should also pay attention to how the availability of collateral affect investments. Chaney et al. (2012) investigates real estate as collateral and how shocks in the real estate market impacts corporate investments. The study is important as real estate can represent a large share of total assets for firms. To measure the sensitivity of the value of the collateral, the authors used local variations in housing prices as shocks to the real estate market. It is shown that investments increase by a small portion when the value of real estate appreciates. The increase in investments are financed by the issuance of more debt. This effect is more evident for small firms which are more financially constrained. It is apparent that the value of the liquidated assets has a distinct role when assessing a firm's debt capacity. Bernanke and Gertler (1989) emphasizes the macroeconomic consequences of this relationship. Chaney et al. (2012) assume that all debt is secured and they do not mention the role of collateral volatility. One should look to Brunnermeier et al. (2012), which reasons for why it is important to consider collateral volatility. Their article examines the effects of financial frictions in the economy. The authors find that financial frictions further enhance illiquidity. Financial instability is a result of liquidity spirals, and the downturns are worsened by restrictions in the availability of credit. Thus, a need for liquid assets and funding arises. Frictions can be reduced by financial institutions. The institutions will at the same time enhance financial fragility and price instability. When the collateral value decreases and margins rise, the markets of secured funding are subject to so called "collateral runs". On the other side, unsecured debt is only subject to traditional bank runs. Other contributions to secured debt's effect on the investment are shown through a model where the lenders can force payback from the borrowers only if the debt is secured. The model is described in Kiyotaki and Moore (1997) and assumes that assets used as production factors in the economy are pledged as collateral. The theory presented is that shocks to technology or income distribution may cause fluctuations in output and asset prices. These fluctuations will then affect the extension of credit by the lenders.

Extensive research exists on the relationship between credit quality and investments in connection to business cycles. Bernanke et al. (1996) describes this relationship by looking into unsecured debt. Financial accelerator is a term which states that adverse shocks to the economy may be enlarged by worsening credit-market

conditions. Theory states that borrowers who meets higher agency costs in the credit markets, should get less extended credit in recession times. These borrowers therefore accounts for a proportionally greater part of the decline in economic activity as they exacerbate the effect of recessions. Further investigation of business cycles can be found in Bernanke and Gertler (1989). Their model states that the agency costs of real investment financing are reduced when the borrower's net worth is high. Borrower's net worth is connected to business upturns, hence the agency costs will decrease as the net worth increase with the economic upturn. Due to accelerator effects, the increase in investments will strengthen the good times. The opposite effect will be evident in economic downturns. The fluctuations are affected by shocks, for example debt deflation, which affects the net worth. Moving on to the conclusion of their research, the authors show that the macroeconomic fluctuations are more influenced by the agency costs than the cost of monitoring. Deviations from the first and best outcome that are associated with the necessity of external funding, should be included in agency costs.

3. Research question and objectives of the thesis

3.1 Research question

The research question should guide us to contribute with valuable information on the difference between secured and unsecured debt. Given the background and motivation for our thesis, we have defined the following research question.

What are the sources of the collateral pledged, and how does the valuation and volatility of the collateral affect the firm's investments?

3.2 Hypotheses

The empirical part of our thesis will be twofold. First, we will argue that the aggregated risk of the firm and hence the eventual, assessed volatility of the collateral will be a key determinant for whether the company can borrow secured or unsecured debt. As risk, measured by betas, is directly linked to debt spreads, our hypotheses allow us to test the implications in terms of unsecured and secured debt spreads. The risk will in this case determine the choice of secured or unsecured debt in terms of the debt spread. For the secured case, the test will also reveal if

firms pledge additional or even substitute real estate as collateral. In the light of the objectives of the thesis, we have defined the hypotheses below.

Hypothesis 1: *Secured debt is used by firms with high asset volatility.*

Hypothesis 2: Borrowing dynamics
- *High asset volatility and no collateral: low leverage and financially constrained.*
- *High asset volatility and high collateral: issue secured debt.*
- *Low asset volatility: borrow unsecured debt and keep collateral as a reserve for future debt capacity.*

Hypothesis 3: *Asset volatility directly maps into interest rates on debt contracts. Thus, unsecured debt is cheaper as it is lent to low asset volatility firms.*

In the second part, we will start by using the database created by Biguri and text-search techniques to create a register for collateral used. We will derive empirical evidence on the sources and valuation of collateral. By analyzing the determinants of each source of collateral pledged, we will consider whether different types of debt instruments require specific types of collateral. In addition, we will investigate to what extent firms rely on sources of collateral unrelated to real estate. Following Ang (2009), we will measure the beta of the assets, which will function as a proxy for the volatility of the collateral availability of the firm. The betas will be estimated with the method described in Acharya et al. (2012). The method is based on several assumptions. The total value of a firms is calculated with the following formula:

$$\frac{dV}{V} = \mu dt + \sigma_V dW$$

Where V is the total value, μ is the expected continuously compounded return on V, σ_V is the volatility of the firm value, and dW is a standard Wiener process.

After rearranging and substituting, the beta of the assets is given by this final formula:

$$\beta_{Asset} = \beta_{Equity} \times \frac{E}{V} \times N(d_1)$$

Where $d_1 = \frac{\ln(V/F)+\left(r+\frac{1}{2}\sigma_V^2\right)T}{\sigma_V\sqrt{T}}$.

We will study how debt structure is determined by two-way sorting of the beta of assets, and the level of collateral or sources of collateral pledged. In addition, we will complement the descriptive evidence with cross-sectional regression estimation. Thus, we will show how debt structure varies with changes in the beta of assets and the level of collateral. To address concerns regarding reverse causality, omitted variables and measurement error, we will add a shock to systematic risk to show variation in the terms of debt structure. By adding this shock, we will be able to test our stated hypotheses.

3.3 Objectives of the thesis

By answering our research question we will contribute to the literature by showing that unsecured debt is indeed cheaper than secured debt. We will also provide and support our conclusions with empirical evidence and give arguments for why this is the case. We have divided the objectives of our thesis into seven steps. As the literature has considered all debt as secured, it has also been a common assumption that real estate has been used when pledging collateral. However, as a substitution, companies pledge other assets like receivables, inventories, intangible assets, cash and marketable securities. Thus, as our first step, we will show that there are other sources of collateral.

In the second step, we will provide descriptive evidence on valuation of collateral and the volatility of collateral of debt holdings. We want to show three results. The first result is that firms with low collateral volatility borrow unsecured debt. The second tells us that firms with high collateral volatility and high valuation of collateral, borrow secured debt. The third result shows that firms with high collateral volatility and low valuation of collateral, borrow very little as they are financially constrained. The intuition behind these results is that if the volatility of the assets is low, creditors know that the likelihood of getting their money back is high if the firm should default. On the other side, if the volatility of the assets is high, there is a lower probability of being repaid if the borrower defaults. Thus, only firms that have high value of collateral or a lot of assets to pledge, will get

secured financing. Those that pledges collateral with low value, get very little or no access to debt at all.

In step three, descriptive analysis of creditworthiness and the volatility of collateral of debt holdings will be provided. Here, the results are not straightforward. We could find that firms with low collateral volatility and high credit worthiness borrow unsecured debt. Another explanation could be that firms with high collateral volatility and high creditworthiness borrow unsecured debt. However, it could also be that firms with high collateral volatility and low creditworthiness borrow secured debt. As the answer will be evident later in our thesis, we can enlighten the reader that the intuition is that unsecured debt depends positively on a firm's creditworthiness, but negatively on collateral volatility.

In step four, we will outline the relationship between growth opportunities and the volatility of collateral of debt holdings. There are several possible outcomes of this research. One possible outcome is that firms with low collateral volatility and high growth opportunities borrow unsecured debt. We could instead, find that firms with high collateral volatility and high growth opportunities borrow unsecured debt. Another possibility is that firms with high collateral volatility and low growth opportunities borrow secured debt or they are financially constrained. The intuition behind these explanations is to show that unsecured debt depends positively on firm's growth opportunities and negatively on collateral volatility.

In step five, we will look at the determinants for the sources of collateral, the valuation of the collateral pledged and the volatility of it. For this analysis, we will run a linear regression on the mentioned dependent variables. In the linear regression model, we will use different explanatory variables as controls. There are many explanatory variables we can think of and use. Examples can be expenditures, research and development, growth opportunities, profitability, size or various others that might fit the model. The intuition behind the fifth step is to investigate the different firms which pledge different sources of collateral and how the firms' different characteristics will impact the valuation of the collateral. In addition, we will examine how the volatility of the collateral pledged is dependent on the firm's characteristics.

In the sixth step, we want to understand the relation between firm's debt structure and the volatility of collateral. We will therefore create a table with determinants of debt structure. We will run a linear regression on unsecured debt over total debt using the volatility of collateral and different explanatory variables as controls. The table is somewhat like the one we will provide in the second step. However, this table is more robust. In addition, we will analyse investment as a function of debt structure and collateral volatility.

In the seventh step, we will explore some aspects which are important for the intuition of this research. These aspects are the debt contracts' interest rates on secured and unsecured debt contracts, and the determinants for them. We will also run a linear regression in this step. More specifically, we will run the regression on interest rates of the unsecured and secured debt contracts, having the volatility of the collateral and other factors as explanatory variables. Because the risk of the assets is lower in the unsecured case, the intuition in this step is that unsecured debt in cheaper than secured debt. Reasonably and logically, lower risk will lead to lower interest rates on debt.

4. Methodology

4.1 Research design and methodology

The research design describes the type of study. Both descriptive and explanatory research designs are applicable for our master thesis. It is descriptive in the sense that we want to understand the sources of collateral. It is also explanatory as we want to know what determines each type of collateral pledged and how the different sources affect the interest rates on debt. In addition, the design of our research can be characterized as longitudinal. By examining the panel data, we will be able to see how collateral valuation and collateral volatility relate to debt structure and other firm characteristics.

There are two types of research methodologies, the quantitative and the qualitative approaches. Quantitative research fits to an explanatory research design, and qualitative to a descriptive. We need to apply both, as our field is descriptive in the way that we want to understand the sources of collateral, and explanatory since we

want to know what determines each type of pledge and their importance on the interest rates.

4.2 Data selection

In our master thesis, we will be working with different types of secondary data, gathered in the period 1996-2012. This data concerns balance sheet characteristics of U.S. public firms, debt contract terms for bank debt and data concerning collateral sources, valuation and volatility. The data can be found in different databases, such as Compustat, Capital IQ.

Regarding the data over collateral sources, valuation and volatility, the database is created by Biguri (2015) by using Edgar, a database with over two million different company reports for U.S. public firms. She has used a text-search algorithm, which is a code that looks for specific keywords within a text, to identify the sources of collateral that are pledged for the firms. We are looking for various sources of collateral, including tangible assets, inventories, cash, receivables, intangible assets and other type of assets. In order to construct a collateral absorption index, we multiply the dummy variables for each source of collateral by the collateral item. The collateral absorption index shows valuation of the collateral pledged. We also need to create two additional data requirements. We will construct data on the beta of the stock, which we will estimate by using linear regression. In addition, we will need data on the beta of the assets. The betas will be estimated by using the construction procedure mentioned in appendix B in Acharya et al. (2013). With all these data, we will be able to create the tables mentioned in the objectives of our thesis.

4.3 Descriptive statistics

4.3.1 Descriptive statistics of debt structure

	Mean	Median	Std. Dev.
punsec	0.679	0.905	0.373
punsec_at	0.120	0.046	0.153
psec_at	0.055	0.000	0.112
tang	0.208	0.166	0.167
fs	0.747	0.806	0.254
mtb	2.197	1.274	3.798
cashflow_at	-0.063	0.061	0.520
age	10.291	10.000	5.833
cash_inv_pct	0.245	0.143	0.262
lsize	5.284	5.138	2.131
capex_at	0.043	0.030	0.049
ldebt	3.437	3.478	2.906
beta	1.284	1.223	0.331
betaamr	1.159	1.148	1.095
const1	0.429	0.000	0.495
const2	0.209	0.000	0.407
const3	0.777	1.000	0.416
const4	0.288	0.000	0.453
const5	0.150	0.000	0.357
const6	0.929	1.000	0.257
cai_at	0.076	0.000	0.200
dummy_coll	0.300	0.000	0.458
dummy_collfin	0.288	0.000	0.453
dummy_collfintang	0.123	0.000	0.328
dummy_collfinintang	0.036	0.000	0.186
dummy_collfinrec	0.072	0.000	0.259
dummy_collfininv	0.061	0.000	0.238
dummy_collfincash	0.056	0.000	0.229
wedge_coll	-0.132	-0.123	0.239
undercoll	32.880	0.000	742.618

Table 1: Summary statistics for the sample

Table 1 shows that firms have more unsecured debt than secured in their debt structure. Fewer than one third of the firms in the sample pledge collateral in financial debt contracts. The value of collateral relative to total assets is low. The table also shows that the most common type of collateral is tangible assets in the form of PPE. Few firms pledge intangible assets, account receivables, inventories and cash as collateral. The available collateral of firms is not exhausted as the variable *wedge_coll* is negative.

| | Strcat | | | | | | | | | | | | | | | | | |
| | 1 | | | 2 | | | 3 | | | 4 | | | 5 | | | 6 | | |
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
punsec	0.000	0.000	0.000	0.093	0.076	0.076	0.378	0.378	0.076	0.619	0.615	0.073	0.939	0.971	0.071	1.000	1.000	0.000
punsec_at	0.000	0.000	0.000	0.021	0.010	0.028	0.085	0.058	0.028	0.152	0.139	0.083	0.239	0.220	0.165	0.194	0.170	0.163
psec_at	0.020	0.000	0.082	0.216	0.192	0.162	0.138	0.102	0.130	0.094	0.081	0.130	0.015	0.004	0.024	0.000	0.000	0.000
tang	0.152	0.107	0.144	0.263	0.222	0.181	0.223	0.175	0.174	0.234	0.197	0.166	0.236	0.197	0.168	0.205	0.166	0.162
fs	0.909	1.000	0.190	0.678	0.713	0.244	0.698	0.780	0.282	0.660	0.689	0.278	0.645	0.667	0.239	0.724	0.759	0.226
mtb	2.978	1.547	5.479	1.617	1.072	1.956	2.145	1.256	2.990	1.909	1.119	2.792	1.731	1.164	2.370	2.079	1.230	3.436
cashflow_at	-0.179	0.047	0.827	0.002	0.062	0.230	-0.065	0.047	0.333	-0.053	0.053	0.382	-0.006	0.066	0.295	-0.022	0.073	0.411
cash_inv_pct	0.382	0.328	0.287	0.170	0.080	0.213	0.248	0.121	0.279	0.195	0.075	0.252	0.165	0.078	0.210	0.204	0.120	0.223
age	10.336	10.000	5.947	10.026	9.000	5.770	9.078	8.000	5.678	9.690	9.000	5.729	10.574	10.000	5.742	10.764	10.000	5.812
lsize	4.703	4.582	2.155	4.983	4.867	1.578	4.842	4.573	1.818	5.113	4.882	1.897	5.966	5.968	2.111	5.795	5.880	2.287
capex_at	0.038	0.025	0.050	0.049	0.032	0.054	0.044	0.030	0.047	0.046	0.032	0.048	0.047	0.035	0.047	0.042	0.031	0.045
ldebt	234.323	0.000	1,114.085	141.722	19.054	443.827	279.882	9.477	899.383	331.257	15.733	955.794	692.309	96.574	1,743.061	591.937	47.034	1,602.104
beta	1.311	1.253	0.333	1.311	1.292	0.311	1.308	1.223	0.334	1.306	1.225	0.324	1.263	1.220	0.333	1.237	1.172	0.332
betaamr	1.262	1.148	1.134	1.092	1.148	1.091	1.203	1.148	1.180	1.154	1.148	1.122	1.101	1.110	1.059	1.105	1.142	1.024
const1	0.435	0.000	0.496	0.541	1.000	0.498	0.504	1.000	0.500	0.508	1.000	0.500	0.382	0.000	0.486	0.344	0.000	0.475
const2	0.286	0.000	0.452	0.188	0.000	0.391	0.258	0.000	0.438	0.217	0.000	0.413	0.134	0.000	0.341	0.170	0.000	0.376
const3	0.889	1.000	0.314	0.865	1.000	0.342	0.834	1.000	0.372	0.761	1.000	0.426	0.644	1.000	0.479	0.690	1.000	0.462
const4	0.299	0.000	0.458	0.283	0.000	0.450	0.386	0.000	0.487	0.353	0.000	0.478	0.271	0.000	0.445	0.232	0.000	0.422
const5	0.209	0.000	0.407	0.140	0.000	0.347	0.176	0.000	0.381	0.154	0.000	0.361	0.095	0.000	0.294	0.119	0.000	0.324
const6	0.954	1.000	0.209	0.995	1.000	0.070	0.993	1.000	0.085	0.990	1.000	0.101	0.889	1.000	0.314	0.851	1.000	0.356
cai_at	0.018	0.000	0.104	0.185	0.000	0.279	0.159	0.000	0.267	0.170	0.000	0.274	0.102	0.000	0.218	0.000	0.000	0.000
dummy_coll	0.062	0.000	0.240	0.634	1.000	0.482	0.618	1.000	0.486	0.626	1.000	0.484	0.425	0.000	0.494	0.000	0.000	0.000
dummy_collfin	0.065	0.000	0.247	0.655	1.000	0.475	0.603	1.000	0.489	0.607	1.000	0.488	0.157	0.000	0.364	0.000	0.000	0.000
dummy_collfinintang	0.025	0.000	0.156	0.309	0.000	0.462	0.267	0.000	0.442	0.274	0.000	0.446	0.042	0.000	0.200	0.000	0.000	0.000
dummy_collfinintang	0.010	0.000	0.099	0.081	0.000	0.273	0.087	0.000	0.282	0.088	0.000	0.283	0.106	0.000	0.308	0.000	0.000	0.000
dummy_collfinrec	0.017	0.000	0.129	0.160	0.000	0.366	0.142	0.000	0.349	0.170	0.000	0.376	0.087	0.000	0.282	0.000	0.000	0.000
dummy_collfininv	0.016	0.000	0.127	0.141	0.000	0.348	0.114	0.000	0.317	0.132	0.000	0.339	0.094	0.000	0.291	0.000	0.000	0.000
dummy_collfinncash	0.011	0.000	0.105	0.118	0.000	0.322	0.113	0.000	0.316	0.111	0.000	0.314	0.087	0.000	0.282	0.000	0.000	0.000
wedge_coll	-0.135	-0.100	0.166	-0.079	-0.099	0.307	-0.064	-0.078	0.295	-0.065	-0.087	0.297	-0.135	-0.145	0.271	-0.205	-0.166	0.162
undercoll	4.131	0.000	300.783	3.899	0.000	37.057	51.732	0.000	1,640.217	34.142	0.000	519.193	118.041	0.000	1,153.301	0.000	0.000	0.000

Table 2: Summary statistics of debt structure

Table 2 shows summary statistics over firms' debt structure. The table reveals several firm characteristics related to debt structure. Comparing the firms with debt structure of 100% secured debt to those with 100% unsecured debt, we see that firms which are only borrowing unsecured debt, borrow more than those with only secured debt. In addition, these differences are the most central; Firms with 100% secured debt have higher book value of equity, investment opportunities, cash

holdings, beta of equity and beta of assets. In addition, they score higher on the mean values of all the financial constraints. Firms with 100% unsecured debt have higher tangibility, operating cash flows, age and are larger in size. From this summary statistics, the capital expenditures seem to be almost equal between the two poles, but it is slightly higher for firms with 100% unsecured debt.

| | Betaacat | | | | | | | | | | | |
| | 1 | | | 2 | | | 3 | | | 4 | | |
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Mean	Median	Std. Dev
punsec	0.682	0.909	0.374	0.701	0.961	0.376	0.679	0.891	0.370	0.657	0.834	0.372
punsec_at	0.145	0.081	0.165	0.134	0.076	0.153	0.118	0.038	0.156	0.088	0.0170	0.133
psec_at	0.066	0.001	0.123	0.055	0.000	0.111	0.057	0.000	0.117	0.043	0.000	0.095
tang	0.237	0.201	0.173	0.221	0.181	0.163	0.199	0.152	0.176	0.177	0.136	0.146
fs	0.700	0.727	0.260	0.725	0.750	0.245	0.747	0.827	0.268	0.812	0.907	0.225
mtb	1.695	1.117	1.924	1.722	1.191	2.054	2.840	1.344	6.037	2.451	1.505	3.226
cashflow_at	-0.010	0.066	0.322	0.011	0.072	0.256	-0,157	0.051	0.807	-0.079	0.048	0.423
cash_inv_pct	0.181	0.077	0.232	0.201	0.102	0.236	0.271	0.159	0.283	0.318	0.250	0.266
age	10.095	10.000	5.224	11.373	11.000	5.938	9.859	9.000	6.389	9.967	10.000	5.643
lsize	5.275	5.033	2.030	5.832	5.690	2.053	4.942	4.939	2.407	5.120	5.016	1.860
capex_at	0.043	0.032	0.044	0.042	0.032	0.040	0.043	0.027	0.059	0.044	0.030	0.048
ldebt	3.648	3.629	2.732	4.063	4.435	2.856	3.213	3.226	3.056	2.856	2.785	2.825
beta	1.204	1.161	0.312	1.245	1.200	0.300	1.219	1.015	0.301	1.472	1.511	0.334
betaamr	-0.081	0.126	0.724	0.850	0.851	.0167	1.257	1.148	0.144	2.562	2.318	0.778
const1	0.403	0.000	0.490	0.341	0.000	0.474	0.492	0.000	0.500	0.462	0.000	0.499
const2	0.202	0.000	0.402	0.140	0.000	0.347	0.281	0.000	0.449	0.195	0.000	0.397
const3	0.768	1.000	0.422	0.701	1.000	0.458	0.792	1.000	0.406	0.835	1.000	0.371
const4	0.245	0.000	0.430	0.219	0.000	0.413	0.360	0.000	0.480	0.312	0.000	0.463
const5	0.156	0.000	0.363	0.107	0.000	0.309	0.187	0.000	0.390	0.140	0.000	0.347
const6	0.907	1.000	0.291	0.878	1.000	0.327	0.947	1.000	0.225	0.976	1.000	0.153
cai_at	0.078	0.000	0.205	0.075	0.000	0.199	0.077	0.000	0.201	0.075	0.000	0.194
dummy_coll	0.294	0.000	0.456	0.284	0.000	0.451	0.301	0.000	0.459	0.321	0.000	0.467
dummy_collfin	0.295	0.000	0.456	0.274	0.000	0.446	0.283	0.000	0.451	0.298	0.000	0.457
dummy_collfintang	0.120	0.000	0.324	0.124	0.000	0.329	0.122	0.000	0.327	0.127	0.000	0.333
dummy_collfinintang	0.031	0.000	0.174	0.035	0.000	0.185	0,039	0.000	0.193	0.038	0.000	0.192
dummy_collfinrec	0.073	0.000	0.261	0.072	0.000	0.259	0.076	0.000	0.266	0.067	0.000	0.250
dummy_collfininv	0.064	0.000	0.245	0.064	0.000	0.244	0.060	0.000	0.237	0.055	0.000	0.228
dummy_collfincash	0.045	0.000	0.208	0.046	0.000	0.209	0.065	0.000	0.247	0.064	0.000	0.245
wedge_coll	-0.159	-0.159	0.248	-0.145	-0,144	0.240	-0.123	-0.104	0.246	-0.101	-0.097	0.218
undercoll	39.862	0.000	737.375	20.183	0.000	341.972	28.356	0.000	601.757	41.964	0.000	1,071.623

Table 3: Summary statistics for collateral volatility

Table 3 shows the summary statistics for the collateral volatility. It tells us that there is a non-linear relationship between unsecured debt and the volatility of collateral. Firms with low collateral volatility, borrow unsecured debt. When collateral volatility increases, cash becomes more common to pledge as collateral. Firms' tangibility decreases as collateral volatility increases.

| | Tangcat | | | | | | | | | | | |
| | 1 | | | 2 | | | 3 | | | 4 | | |
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Mean	Median	Std. Dev
punsec	0.723	0.978	0.353	0.693	0.928	0.367	0.683	0.914	0.375	0.638	0.805	0.384
punsec_at	0.072	0.001	0.139	0.109	0.033	0.147	0.078	0.155	0.162	0.126	0.158
psec_at	0.029	0.000	0.088	0.043	0.000	0.098	0.058	0.001	0.112	0.089	0.010	0.136
tang	0.037	0.037	0.021	0.116	0.115	0.026	0.222	0.218	0.038	0.444	0.407	0.127
fs	0.860	0.994	0.226	0.781	0.867	0.242	0.715	0.753	0.249	0.640	0.655	0.247
mtb	3.243	1.741	5.667	2.215	1.335	3.461	1.836	1.244	2.470	1.574	1.008	2.734
cashflow_at	-0.264	-0.04	0.809	-0.047	0.058	0.397	0.007	0.074	0.364	0.017	0.076	0.394
cash_inv_pct	0.474	0.459	0.318	0.265	0.201	0.237	0.166	0.104	0.175	0.094	0.049	0.114
age	9.384	9.000	5.978	10.916	11.000	6.048	10.663	10.000	5.745	10.071	9.000	5.444
lsize	4.226	4.166	1.937	5.392	5.206	2.119	5.657	5.567	2.013	5.765	5.765	2.101
capex_at	0.015	0.012	0.026	0.031	0.025	0.024	0.048	0.039	0.038	0.075	0.056	0.069
ldebt	1.665	1.639	2.994	3.254	3.237	3.044	3.817	3.810	2.651	4.247	4.471	2.488
beta	1.334	1.288	0.348	1.304	1.275	0.333	1.268	1.223	0.324	1.235	1.172	0.312
betaamr	1.333	1.148	1.214	1.246	1.148	1.108	1.098	1.106	1.041	0.973	0.994	0.982
const1	0.526	1.000	0.499	0.413	0.000	0.492	0.377	0.000	0.485	0.409	0.000	0.492
const2	0.345	0.000	0.475	0.196	0.000	0.397	0.155	0.000	0.362	0.153	0.000	0.360
const3	0.936	1.000	0.245	0.780	1.000	0.414	0.727	1.000	0.446	0.679	1.000	0.467
const4	0.405	0.000	0.491	0.284	0.000	0.451	0.240	0.000	0.427	0.233	0.000	0.423
const5	0.246	0.000	0.431	0.144	0.000	0.351	0.109	0.000	0.312	0.109	0.000	0.311
const6	0.995	1.000	0.071	0.930	1.000	0.255	0.903	1.000	0.295	0.894	1.000	0.308
cai_at	0.039	0.000	0.158	0.063	0.000	0.176	0.078	0.000	0.191	0.122	0.000	0.250
dummy_coll	0.189	0.000	0.391	0.302	0.000	0.459	0.321	0.000	0.467	0.380	0.000	0.485
dummy_collfin	0.173	0.000	0.379	0.284	0.000	0.451	0.319	0.000	0.466	0.366	0.000	0.482
dummy_collfintang	0.067	0.000	0.250	0.111	0.000	0.314	0.133	0.000	0.339	0.176	0.000	0.381
dummy_collfinintang	0.031	0.000	0.173	0.040	0.000	0.195	0.034	0.000	0.181	0.039	0.000	0.194
dummy_collfinrec	0.030	0.000	0.170	0.065	0.000	0.247	0.081	0.000	0.273	0.110	0.000	0.312
dummy_collfininv	0.024	0.000	0.153	0.049	0.000	0.215	0.066	0.000	0.249	0.100	0.000	0.300
dummy_collfincash	0.043	0.000	0.202	0.065	0.000	0.246	0.052	0.000	0.222	0.062	0.000	0.240
wedge_coll	0.003	-0.032	0.158	-0.053	-0.106	0.178	-0.143	-0.203	0.192	-0.322	-0.367	0.273
undercoll	35.754	0.000	678.564	39.574	0.000	620.872	21.003	0.000	501.109	35.540	0.000	1,053.490

Table 4: Summary statistics for tangibility

Table 4 shows summary statistics over the tangibility categories. When firms have more collateral available, they have less unsecured debt in their debt structure. When the collateral availability increases, the collateral volatility decreases and firms become less risky. Together with the increasing collateral availability, it is more common to pledge collateral in financial debt contracts. Together with the decreasing collateral volatility, it becomes more common to pledge PPE, account receivables and inventories.

4.3.2 Descriptive statistics of investments and collateral

	Capex_atcat											
		1			2			3			4	
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Mean	Median	Std. Dev
punsec	0.660	0.844	0.376	0.689	0.928	0.371	0.700	0.943	0.369	0.665	0.869	0.376
punsec_at	0.094	0.009	0.149	0.127	0.052	0.156	0.138	0.081	0.155	0.124	0.059	0.150
psec_at	0.052	0.000	0.114	0.056	0.000	0.112	0.057	0.000	0.116	0.057	0.001	0.109
tang	0.100	0.057	0.129	0.168	0.131	0.133	0.232	0.205	0.142	0.331	0.307	0.168
fs	0.797	0.929	0.257	0.736	0.787	0.259	0.713	0.743	0.255	0.740	0.783	0.238
mtb	2.666	1.312	5.347	1.810	1.171	2.469	1.929	1.232	2.689	2.382	1.404	3.912
cashflow_at	-0.229	-0.005	0.796	-0.018	0.058	0.301	0.008	0.074	0.306	-0.016	0.090	0.486
cash_inv_pct	0.376	0.295	0.323	0.236	0.142	0.247	0.190	0.102	0.215	0.178	0.106	0.196
age	10.585	10.000	6.005	11.147	11.000	5.879	10.624	10.000	5.720	8.816	8.000	5.449
lsize	4.368	4.243	2.089	5.562	5.437	2.040	5.828	5.727	2.104	5.379	5.272	1.999
capex_at	0.008	0.008	0.005	0.022	0.022	0.004	0.041	0.040	0.007	0.081	0.081	0.065
ldebt	2.402	2.319	2.966	3.664	3.834	2.930	4.052	4.429	2.860	3.427	3.464	2.655
beta	1.326	1.287	0.336	1.298	1.225	0.328	1.255	1.220	0.327	1.258	1.184	0.327
betaamr	1.192	1.148	1.172	1.169	1.148	1.082	1.113	1.105	1.029	1.162	1.148	1.091
const1	0.534	1.000	0.499	0.419	0.000	0.493	0.366	0.000	0.482	0.397	0.000	0.489
const2	0.344	0.000	0.475	0.174	0.000	0.379	0.142	0.000	0.349	0.176	0.000	0.381
const3	0.889	1.000	0.314	0.740	1.000	0.439	0.695	1.000	0.461	0.784	1.000	0.411
const4	0.354	0.000	0.478	0.267	0.000	0.442	0.252	0.000	0.434	0.279	0.000	0.448
const5	0.258	0.000	0.437	0.127	0.000	0.333	0.102	0.000	0.303	0.113	0.000	0.316
const6	0.984	1.000	0.127	0.926	1.000	0.261	0.885	1.000	0.319	0.921	1.000	0.269
cai_at	0.065	0.000	0.190	0.076	0.000	0.197	0.077	0.000	0.199	0.089	0.000	0.212
dummy_coll	0.259	0.000	0.438	0.322	0.000	0.467	0.304	0.000	0.460	0.317	0.000	0.465
dummy_collfin	0.250	0.000	0.433	0.306	0.000	0.461	0.296	0.000	0.456	0.300	0.000	0.458
dummy_collfintang	0.107	0.000	0.309	0.125	0.000	0.331	0.122	0.000	0.327	0.138	0.000	0.345
dummy_collfinintang	0.038	0.000	0.191	0.040	0.000	0.195	0.035	0.000	0.183	0.032	0.000	0.176
dummy_collfinrec	0.057	0.000	0.231	0.080	0.000	0.272	0.078	0.000	0.268	0.075	0.000	0.263
dummy_collfininv	0.052	0.000	0.221	0.063	0.000	0.243	0.063	0.000	0.244	0.064	0.000	0.245
dummy_collfincash	0.059	0.000	0.235	0.059	0.000	0.236	0.055	0.000	0.228	0.050	0.000	0.218
wedge_coll	-0.036	-0.036	0.207	-0.092	-0.103	0.215	-0.155	-0.169	0.225	-0.243	-0.259	0.256
undercoll	26.780	0.000	476.113	30.588	0.000	526.017	38.551	0.000	788.119	35.597	0.000	1,039.641

Table 5: Summary statistics for firms' investments

Table 5 shows summary statistics for firms' investments. Firms that invest more also have more collateral available.

In the following tables, we will analyse the financial constraints. The financial constraints are dummies which will take the value of 1 if constrained, and 0 otherwise. After the last table, we will have a concluding paragraph on the common patterns.

| | Const1 Dividend Payout | | | | | |
| | 0 | | | 1 | | |
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
punsec	0.731	0.974	0.358	0.611	0.704	0.382
punsec_at	0.125	0.059	0.148	0.115	0.032	0.160
psec_at	0.042	0.000	0.097	0.074	0.002	0.128
tang	0.215	0.177	0.162	0.198	0.149	0.173
fs	0.756	0.801	0.239	0.734	0.813	0.273
mtb	2.064	1.328	2.867	2.379	1.181	4.778
cashflow_at	-0.002	0.077	0.396	-0.133	0.025	0.626
cash_inv_pct	0.229	0.133	0.247	0.266	0.156	0.280
age	10.976	11.000	5.783	9.337	8.000	5.768
lsize	5.810	5.742	2.141	4.585	4.496	1.906
capex_at	0.044	0.033	0.045	0.026	0.026	0.053
ldebt	3.915	4.324	3.008	2.782	2.732	2.622
beta	1.261	1.220	0.331	1.315	1.248	0.328
betaamr	0.328	1.109	1.038	1.213	1.148	1.165
const1	0.000	0.000	0.000	1.000	1.000	0.000
const2	0.151	0.000	0.358	0.287	0.000	0.452
const3	0.714	1.000	0.452	0.861	1.000	0.346
const4	0.261	0.000	0.439	0.324	0.000	0.468
const5	0.108	0.000	0.310	0.206	0.000	0.404
const6	0.883	1.000	0.322	0.991	1.000	0.095
cai_at	0.060	0.000	0.175	0.098	0.000	0.227
dummy_coll	0.261	0.000	0.439	0.353	0.000	0.478
dummy_collfin	0.243	0.000	0.429	0.348	0.000	0.476
dummy_collfintang	0.102	0.000	0.302	0.151	0.000	0.358
dummy_collfinintang	0.029	0.000	0.167	0.046	0.000	0.209
dummy_collfinrec	0.058	0.000	0.233	0.092	0.000	0.289
dummy_collfininv	0.044	0.000	0.206	0.082	0.000	0.275
dummy_collfincash	0.045	0.000	0.208	0.070	0.000	0.254
wedge_coll	-0.155	-0.145	0.224	-0.010	-0.091	0.255
undercoll	27.990	0.000	513.457	39.389	0.000	966.764

Table 6: Summary statistics for financial constraint 1

Firms paying dividends tend to borrow less and have less unsecured debt in their debt structure. If firms are constrained by dividend-payout ratio, they tend to be younger in age than unconstrained firms. They also tend to pledge more collateral than those which are unconstrained. The collateral volatility of the constrained firms is higher than for unconstrained.

	Const2 Size					
	0			1		
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
punsec	0.693	0.930	0.372	0.620	0.690	0.375
punsec_at	0.133	0.065	0.158	0.075	0.008	0.127
psec_at	0.057	0.000	0.115	0.051	0.000	0.104
tang	0.219	0.179	0.165	0.166	0.108	0.169
fs	0.727	0.770	0.255	0.819	0.935	0.238
mtb	1.753	1.227	1.904	3.879	1.631	7.190
cashflow_at	0.033	0.071	0.163	-0.441	-0.126	1.025
cash_inv_pct	0.220	0.121	0.243	0.340	0.243	0.306
age	10.562	10.000	5.858	9.265	8.000	5.622
lsize	6.018	5.751	1.692	2.502	2.805	1.066
capex_at	0.0442	0.032	0.044	0.039	0.020	0.064
ldebt	4.127	4.356	2.614	0.217	0.686	1.839
beta	1.281	1.223	0.331	1.297	1.222	0.329
betaamr	1.172	1.148	1.036	1.109	1.148	1.292
const1	0.387	0.000	0.487	0.588	1.000	0.492
const2	0.000	0.000	0.000	1.000	1.000	0.000
const3	0.718	1.000	0.450	1.000	1.000	0.000
const4	0.247	0.000	0.431	0.444	0.000	0.497
const5	0.010	0.000	0.100	0.679	1.000	0.467
const6	0.910	1.000	0.286	1.000	1.000	0.000
cai_at	0.077	0.000	0.198	0.074	0.000	0.205
dummy_coll	0.315	0.000	0.465	0.245	0.000	0.430
dummy_collfin	0.300	0.000	0.458	0.242	0.000	0.428
dummy_collfintang	0.127	0.000	0.333	0.107	0.000	0.310
dummy_collfinintang	0.037	0.000	0.190	0.031	0.000	0.173
dummy_collfinrec	0.072	0.000	0.259	0.072	0.000	0.259
dummy_collfininv	0.060	0.000	0.238	0.062	0.000	0.241
dummy_collfincash	0.061	0.000	0.240	0.034	0.000	0.181
wedge_coll	-0.142	-0.137	0.241	-0.092	-0.073	0.230
undercoll	38.672	0.000	831.144	10.952	0.000	153.289

Table 7: Summary statistics for constraint 2

Smaller firms tend to borrow more. If firms are constrained by size, they have less unsecured debt in their debt structure than unconstrained firms. In addition, the constrained firms are younger than unconstrained firms. From this constraints table, we see that unconstrained firms pledge more collateral than constrained firms. Also, constrained firms have lower collateral volatility than unconstrained firms.

	Const3 Long-term Debt S&P Rating					
	0			1		
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
punsec	0.807	0.990	0.309	0.635	0.788	0.384
punsec_at	0.246	0.234	0.156	0.087	0.017	0.134
psec_at	0.065	0.001	0.126	0.053	0.000	0.108
tang	0.269	0.228	0.168	0.190	0.147	0.163
fs	0.545	0.568	0.224	0.804	0.900	0.232
mtb	1.424	1.120	1.124	2.410	1.340	4.222
cashflow_at	0.074	0.077	0.073	-0.106	0.050	0.588
cash_inv_pct	0.101	0.059	0.122	0.286	0.197	0.277
age	12.419	12.000	5.642	9.689	9.000	5.744
lsize	7.896	7.827	1.344	4.535	4.539	1.676
capex_at	0.043	0.035	0.033	0.043	0.028	0.052
ldebt	6.574	6.527	1.366	2.247	2.410	2.406
beta	1.176	1.158	0.320	1.315	1.275	0.327
betaamr	1.042	1.023	0.838	1.193	1.148	1.156
const1	0.267	0.000	0.442	0.475	0.000	0.500
const2	0.000	0.000	0.000	0.269	0.000	0.443
const3	0.000	0.000	0.000	1.000	1.000	0.000
const4	0.227	0.000	0.419	0.306	0.000	0.461
const5	0.000	0.000	0.000	0.193	0.000	0.394
const6	0.686	1.000	0.464	0.999	1.000	0.036
cai_at	0.080	0.000	0.200	0.075	0.000	0.200
dummy_coll	0.355	0.000	0.478	0.285	0.000	0.451
dummy_collfin	0.325	0.000	0.468	0.277	0.000	0.448
dummy_collfintang	0.128	0.000	0.334	0.122	0.000	0.327
dummy_collfinintang	0.041	0.000	0.199	0.034	0.000	0.182
dummy_collfinrec	0.091	0.000	0.288	0.067	0.00	0.250
dummy_collfininv	0.072	0.000	0.259	0.057	0.000	0.232
dummy_collfincash	0.086	0.000	0.280	0.047	0.000	0.212
wedge_coll	-0.188	-0.187	0.246	-0.115	-0.104	0.235
undercoll	31.682	0.000	507.707	33.224	0.000	797.367

Table 8: Summary statistics for financial constraint 3

Firms with no debt rating tend to borrow less and have less unsecured debt. Firms with debt rating tend to have higher collateral volatility. Constrained firms without long-term debt S&P rating are younger than unconstrained firms. Unconstrained firms pledge more collateral than constrained firms.

| | Const4 Kaplan&Zingales Index | | | | | |
| | 0 | | | 1 | | |
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
punsec	0.695	0.945	0.375	0.641	0.754	0.367
punsec_at	0.106	0.046	0.130	0.154	0.045	0.195
psec_at	0.043	0.000	0.089	0.087	0.001	0.152
tang	0.218	0.180	0.180	0.181	0.127	0.170
fs	0.777	0.817	0.216	0.673	0.743	0.318
mtb	1.526	1.159	1.441	4.026	2.007	6.596
cashflow_at	0.017	0.071	0.237	-0.336	-0.012	0.950
cash_inv_pct	0.210	0.121	0.232	0.332	0.244	0.309
age	10.976	11.000	5.845	8.391	8.000	5.360
lsize	5.588	5.409	2.062	4.533	4.496	2.115
capex_at	0.043	0.032	0.042	0.044	0.027	0.062
ldebt	3.637	3.615	2.853	2.920	3.110	2.979
beta	1.275	1.223	0.325	1.308	1.223	0.344
betaamr	1.122	1.130	1.056	1.250	1.148	1.180
const1	0.407	0.000	0.491	0.483	0.000	0.500
const2	0.163	0.000	0.370	0.322	0.000	0.467
const3	0.758	1.000	0.428	0.824	1.000	0.381
const4	0.000	0.000	0.000	1.000	1.000	0.000
const5	0.122	0.000	0.327	0.219	0.000	0.413
const6	0.905	1.000	0.294	0.989	1.000	0.103
cai_at	0.070	0.000	0.189	0.092	0.000	0.222
dummy_coll	0.287	0.000	0.452	0.335	0.000	0.472
dummy_collfin	0.274	0.000	0.446	0.323	0.000	0.468
dummy_collfintang	0.113	0.000	0.317	0.148	0.000	0.355
dummy_collfinintang	0.032	0.000	0.175	0.047	0.000	0.211
dummy_collfinrec	0.068	0.000	0.252	0.082	0.000	0.275
dummy_collfininv	0.057	0.000	0.232	0.069	0.000	0.254
dummy_collfincash	0.051	0.000	0.220	0.067	0.000	0.249
wedge_coll	-0.149	-0.141	0.233	-0.089	-0.078	0.250
undercoll	32.880	0.000	800.723	32.880	0.000	574.389

Table 9: Summary statistics for financial constraint 4

The largest difference between constrained and unconstrained firms is seen in the market to book value of total assets (*mtb*). If constrained by the KZI Index, firms borrow more than unconstrained firms. However, the constrained firms tend to have less unsecured debt than unconstrained firms. Here, the unconstrained firms have lower collateral volatility than the unconstrained firms. Constrained firms are younger in age than unconstrained and the constrained firms pledge more collateral.

| Const5 SA Index of Hadlock and Pierce | | | | | |
| | 0 | | | 1 | |
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
punsec	0.689	0.923	0.372	0.615	0.680	0.377
punsec_at	0.129	0.059	0.156	0.073	0.007	0.125
psec_at	0.056	0.000	0.114	0.052	0.000	0.105
tang	0.215	0.176	0.166	0.165	0.108	0.168
fs	0.734	0.781	0.255	0.820	0.939	0.239
mtb	1.935	1.248	2.905	3.646	1.545	6.706
cashflow_at	-0.004	0.068	0.368	-0.115	-0.115	0.959
cash_inv_pct	0.229	0.127	0.251	0.336	0.239	0.301
age	10.375	10.000	5.839	9.855	9.000	5.782
lsize	5.759	5.583	1.913	2.586	2.862	0.993
capex_at	0.044	0.032	0.048	0.035	0.019	0.054
ldebt	3.887	4.066	2.747	0.282	0.759	1.849
beta	1.278	1.223	0.331	1.320	1.223	0.326
betaamr	1.173	1.148	1.053	1.078	1.148	1.305
const1	0.401	0.000	0.490	0.590	1.000	0.492
const2	0.079	0.000	0.270	0.947	1.000	0.224
const3	0.738	1.000	0.440	1.000	1.000	0.000
const4	.0265	0.000	0.441	0.421	0.000	0.494
const5	0.000	0.000	0.000	1.000	1.000	0.000
const6	0.917	1.000	0.277	1.000	1.000	0.000
cai_at	0.076	0.000	0.198	0.077	0.000	0.210
dummy_coll	0.309	0.000	0.462	0.252	0.000	0.434
dummy_collfin	0.295	0.000	0.456	0.248	0.000	0.432
dummy_collfintang	0.125	0.000	0.331	0.112	0.000	0.316
dummy_collfinintang	0.036	0.000	0.187	0.035	0.000	0.184
dummy_collfinrec	0.072	0.000	0.258	0.075	0.000	0.264
dummy_collfininv	0.060	0.000	0.237	0.065	0.000	0.247
dummy_collfincash	0.059	0.000	0.235	0.037	0.000	0.189
wedge_coll	-0.139	-0.133	0.240	-0.088	-0.072	0.231
undercoll	36.650	0.000	802.683	11.476	0.000	155.178

Table 10: Summary statistics for financial constraint 5

If firms are constrained by the SA Index, they borrow less than unconstrained firms. Constrained firms also borrow less unsecured debt and are younger in age. Unconstrained firms have higher collateral volatility and pledge more collateral than unconstrained firms.

| Const6 Commercial Paper Rating | | | | | |
| | 0 | | | 1 | |
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
punsec	0.969	1.000	0.122	0.655	0.836	0.377
punsec_at	0.247	0.241	0.121	0.112	0.034	0.152
psec_at	0.008	0.000	0.039	0.059	0.000	0.115
tang	0.277	0.243	0.153	0.203	0.160	0.167
fs	0.596	0.613	0.190	0.758	0.834	0.255
mtb	1.740	1.388	1.211	2.233	1.262	3.926
cashflow_at	0.090	0.088	0.045	-0.076	0.057	0.539
cash_inv_pct	0.084	0.056	0.088	0.257	0.158	0.267
age	13.305	13.000	5.345	10.048	9.000	5.803
lsize	8.978	8.990	1.106	5.002	4.944	1.917
capex_at	0.045	0.040	0.025	0.043	0.029	0.050
ldebt	7.501	7.552	1.232	3.046	3.117	2.715
beta	0.995	1.000	0.254	1.306	1.248	0.326
betaamr	0.818	0.797	0.619	1.185	1.148	1.119
const1	0.055	0.000	0.227	0.458	0.000	0.498
const2	0.000	0.000	0.000	0.225	0.000	0.418
const3	0.014	0.000	0.118	0.835	1.000	0.371
const4	0.043	0.000	0.203	0.307	0.000	0.461
const5	0.000	0.000	0.000	0.161	0.000	0.368
const6	0.000	0.000	0.000	1.000	1.000	0.000
cai_at	0.013	0.000	0.070	0.081	0.000	0.205
dummy_coll	0.144	0.000	0.352	0.312	0.000	0.463
dummy_collfin	0.091	0.000	0.287	0.303	0.000	0.460
dummy_collfintang	0.019	0.000	0.137	0.131	0.000	0.337
dummy_collfinintang	0.002	0.000	0.040	0.039	0.000	0.193
dummy_collfinrec	0.027	0.000	0.163	0.076	0.000	0.265
dummy_collfininv	0.007	0.000	0.084	0.065	0.000	0.246
dummy_collfincash	0.029	0.000	0.168	0.058	0.000	0.233
wedge_coll	-0.264	-0.238	0.171	-0.121	-0.111	0.241
undercoll	18.104	0.000	397.382	34.008	0.000	762.575

Table 11: Summary statistics for financial constraint 6

Unconstrained firms have more debt, tend to borrow more unsecured and they have lower collateral volatility. Also, firms with a commercial paper rating have a higher amount of collateral pledged. Among all the constraints, types of collateral such as account receivables, inventories and cash, experience largest increase when going from constrained to unconstrained. If firms are constrained by the commercial paper rating, they tend to be younger and pledge more collateral than unconstrained firms.

There are at least two similarities to draw from the constraints. First, the constrained firms tend to be younger in age. Second, the constrained firms tend to borrow less unsecured debt. When analysing collateral volatility, there is no evident pattern to follow. For some constraints, the constrained firms have higher collateral volatility, but for other constraints it is the opposite.

In the following tables, we show summary statistics for type of collateral. We will conclude the summary statistics on the types of collateral with two concluding paragraphs on key findings.

	Dummy_coll					
	0			1		
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
punsec	0.799	0.100	0.332	0.501	0.499	0.359
punsec_at	0.114	0.030	0.154	0.134	0.073	0.152
psec_at	0.025	0.000	0.077	0.126	0.067	0.146
tang	0.193	0.152	0.162	0.243	0.202	0.174
fs	0.792	0.882	0.236	0.640	0.668	0.262
mtb	2.411	1.376	4.215	1.685	1.068	2.456
cashflow_at	-0.085	0.064	0.599	-0.014	0.056	0.268
cash_inv_pct	0.275	0.180	0.273	0.175	0.081	0.219
age	10.257	10.000	5.795	10.374	10.000	5.922
lsize	5.219	5.077	2.212	5.438	5.286	1.923
capex_at	0.042	0.030	0.048	0.046	0.032	0.049
ldebt	3.373	3.506	3.065	3.545	3.440	2.618
beta	1.271	1.221	0.331	1.314	1.288	0.328
betaamr	1.146	1.148	1.093	1.188	1.148	1.010
const1	0.397	0.000	0.489	0.504	1.000	0.500
const2	0.225	0.000	0.418	0.171	0.000	0.376
const3	0.794	1.000	0.404	0.737	1.000	0.440
const4	0.274	0.000	0.446	0.321	0.000	0.467
const5	0.160	0.000	0.367	0.126	0.000	0.331
const6	0.913	1.000	0.281	0.966	1.000	0.181
cai_at	0.016	0.000	0.092	0.218	0.032	0.291
dummy_coll	0.000	0.000	0.000	1.000	1.000	0.000
dummy_collfin	0.071	0.000	0.257	0.793	1.000	0.405
dummy_collfintang	0.029	0.000	0.169	0.341	0.000	0.474
dummy_collfinintang	0.007	0.000	0.082	0.104	0.000	0.305
dummy_collfinrec	0.016	0.000	0.126	0.204	0.000	0.403
dummy_collfininv	0.013	0.000	0.112	0.172	0.000	0.377
dummy_collfincash	0.004	0.000	0.064	0.175	0.000	0.380
wedge_coll	-0.177	-0.141	0.177	-0.025	-0.048	0.319
undercoll	5.136	0.000	190.365	97.477	0.238	1,321.121

Table 12: Summary statistics for firms pledging collateral

Firms pledge collateral when the value of collateral is high. Firms pledging collateral tend to have higher collateral volatility. In addition, the firms pledging collateral tend to be riskier as they have higher equity betas.

	Dummy_collfin					
	0			1		
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
punsec	0.809	1.000	0.323	0.473	0.460	0.356
punsec_at	0.116	0.032	0.154	0.131	0.070	0.151
psec_at	0.024	0.000	0.076	0.133	0.082	0.145
tang	0.193	0.151	0.162	0.245	0.205	0.173
fs	0.792	0.883	0.237	0.634	0.663	0.261
mtb	2.438	1.381	4.264	1.583	1.040	2.074
cashflow_at	-0.087	0.063	0.597	-0.006	0.057	0.254
cash_inv_pct	0.277	0.184	0.272	0.166	0.074	0.215
age	10.270	10.000	5.796	10.348	10.000	5.927
lsize	5.265	5.133	2.236	5.332	5.150	1.846
capex_at	0.042	0.030	0.048	0.046	0.031	0.050
ldebt	3.401	3.559	3.114	3.502	3.363	2.493
beta	1.271	1.220	0.332	1.316	1.290	0.324
betaamr	1.164	1.148	1.092	1.147	1.148	1.102
const1	0.393	0.000	0.488	0.519	1.000	0.500
const2	0.222	0.000	0.416	0.176	0.000	0.381
const3	0.788	1.000	0.408	0.749	1.000	0.434
const4	0.274	0.000	0.446	0.323	0.000	0.468
const5	0.158	0.000	0.365	0.129	0.000	0.335
const6	0.909	1.000	0.287	0.978	1.000	0.148
cai_at	0.000	0.000	0.008	0.265	0.161	0.297
dummy_coll	0.087	0.000	0.282	0.827	1.000	0.378
dummy_collfin	0.000	0.000	0.000	1.000	1.000	0.000
dummy_collfintang	0.000	0.000	0.013	0.427	0.000	0.495
dummy_collfinintang	0.000	0.000	0.007	0.125	0.000	0.331
dummy_collfinrec	0.000	0.000	0.007	0.251	0.000	0.434
dummy_collfininv	0.000	0.000	0.010	0.210	0.000	0.407
dummy_collfincash	0.000	0.000	0.007	0.193	0.000	0.395
wedge_coll	-0.193	-0.151	0.163	0.020	0.000	0.318
undercoll	0.020	0.000	2.614	114.149	1.520	1,380.686

Table 13: Summary statistics for firms pledging collateral in financial debt

If firms pledge collateral in financial debt contracts, they have lower amounts of unsecured debt. Firms pledge collateral in financial debt contracts when the value of collateral is high. Firms pledging collateral in financial debt contracts only tend to have lower collateral volatility.

	Dummy_collfintang					
	0			1		
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
punsec	0.726	0.974	0.361	0.445	0.422	0.345
punsec_at	0.119	0.042	0.154	0.128	0.061	0.152
psec_at	0.044	0.000	0.103	0.136	0.092	0.139
tang	0.201	0.160	0.165	0.257	0.226	0.172
fs	0.762	0.831	0.249	0.634	0.664	0.260
mtb	2.269	1.306	3.959	1.671	1.065	2.217
cashflow_at	-0.697	0.062	0.548	-0.018	0.055	0.254
cash_inv_pct	0.253	0.154	0.265	0.185	0.083	0.234
age	10.305	10.000	5.818	10.191	10.000	5.939
lsize	5.301	5.159	2.180	5.163	4.968	1.745
capex_at	0.042	0.030	0.048	0.048	0.032	0.051
ldebt	3.451	3.572	2.998	3.362	3.130	2.339
beta	1.280	1.223	0.332	1.318	1.288	0.322
betaamr	1.158	1.148	1.096	1.169	1.148	1.087
const1	0.415	0.000	0.493	0.528	1.000	0.499
const2	0.213	0.000	0.409	0.183	0.000	0.386
const3	0.778	1.000	0.415	0.769	1.000	0.422
const4	0.280	0.000	0.449	0.346	0.000	0.476
const5	0.152	0.000	0.359	0.137	0.000	0.343
const6	0.921	1.000	0.270	0.989	1.000	0.104
cai_at	0.022	0.000	0.099	0.467	0.425	0.285
dummy_coll	0.226	0.000	0.418	0.832	1.000	0.374
dummy_collfin	0.188	0.000	0.391	0.999	1.000	0.031
dummy_collfintang	0.000	0.000	0.000	1.000	1.000	0.000
dummy_collfinintang	0.009	0.000	0.095	0.228	0.000	0.419
dummy_collfinrec	0.033	0.000	0.179	0.353	0.000	0.478
dummy_collfininv	0.024	0.000	0.153	0.320	0.000	0.467
dummy_collfincash	0.037	0.000	0.190	0.186	0.000	0.389
wedge_coll	-0.179	-0.149	0.193	0.210	0.057	0.261
undercoll	16.845	0.000	445.556	147.234	4.720	1,747.733

Table 14: Summary statistics for firms pledging PPE in financial debt

Firms pledging tangible assets as collateral have a lower mean age than firms that do not. They are not likely to pledge other types of collateral. Firms that do not pledge tangible assets as collateral borrow less, and most of their debt is unsecured. Firms are more likely to pledge tangible assets in the form of PPE when they become financially constrained.

| | Dummy_collfinintang | | | | | |
| | 0 | | | 1 | | |
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
punsec	0.692	0.930	0.371	0.438	0.430	0.337
punsec_at	0.120	0.045	0.154	0.123	0.060	0.145
psec_at	0.052	0.000	0.109	0.152	0.106	0.153
tang	0.207	0.166	0.166	0.224	0.168	0.181
fs	0.751	0.813	0.253	0.622	0.644	0.265
mtb	2.210	1.279	3.837	1.853	1.162	2.473
cashflow_at	-0.063	0.062	0.524	-0.075	0.041	0.407
cash_inv_pct	0.246	0.145	0.262	0.224	0.098	0.270
age	10.312	10.000	5.822	9.713	9.000	6.104
lsize	5.289	5.146	2.145	5.174	4.952	1.734
capex_at	0.043	0.030	0.049	0.041	0.278	0.045
ldebt	3.440	3.491	2.928	3.374	3.213	2.411
beta	1.283	1.223	0.330	1.314	1.248	0.339
betaamr	1.159	1.148	1.096	1.170	1.148	1.078
const1	0.425	0.000	0.494	0.545	1.000	0.498
const2	0.210	0.000	0.407	0.179	0.000	0.383
const3	0.778	1.000	0.415	0.745	1.000	0.436
const4	0.285	0.000	0.451	0.373	0.000	0.484
const5	0.150	0.000	0.354	0.147	0.000	0.354
const6	0.927	1.000	0.261	0.997	1.000	0.057
cai_at	0.059	0.000	0.172	0.539	0.569	0.309
dummy_coll	0.279	0.000	0.449	0.867	1.000	0.339
dummy_collfin	0.261	0.000	0.439	0.999	1.000	0.033
dummy_collfintang	0.099	0.000	0.298	0.778	1.000	0.416
dummy_collfinintang	0.000	0.000	0.000	1.000	1.000	0.000
dummy_collfinrec	0.578	0.000	0.233	0.462	0.000	0.499
dummy_collfininv	0.046	0.000	0.209	0.459	0.000	0.499
dummy_collfincash	0.049	0.000	0.217	0.221	0.000	0.415
wedge_coll	-0.148	-0.129	0.218	0.315	0.309	0.332
undercoll	24.286	0.000	523.844	263.081	4.767	2,815.354

Table 15: Summary statistics for firms pledging intangible assets in financial debt

The mean age of the companies pledging intangible assets is lower than for companies not pledging intangibles. It is also likely to pledge tangible assets if intangible assets are pledged. In addition, the firms are more likely to pledge intangible assets when they become financially constrained. Firms that do not pledge intangible assets are likely to pledge account receivables.

	Dummy_collfinrec					
	0			1		
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
punsec	0.701	0.947	0.369	0.479	0.481	0.353
punsec_at	0.118	0.042	0.153	0.145	0.095	0.158
psec_at	0.049	0.000	0.106	0.142	0.985	0.147
tang	0.203	0.161	0.165	0.272	0.235	0.175
fs	0.758	0.825	0.250	0.597	0.618	0.262
mtb	2.258	1.311	3.889	1.388	0.915	2.105
cashflow_at	-0.070	0.061	0.538	0.021	0.055	0.176
cash_inv_pct	0.255	0.155	0.267	0.112	0.058	0.141
age	10.268	10.000	5.835	10.601	10.000	5.801
lsize	5.288	5.146	2.145	5.242	5.027	1.945
capex_at	0.043	0.030	0.049	0.046	0.032	0.047
ldebt	3.425	3.501	2.944	3.565	3.278	2.496
beta	1.282	1.223	0.331	1.320	1.290	0.320
betaamr	1.162	1.148	1.098	1.126	1.148	1.060
const1	0.420	0.000	0.494	0.544	1.000	0.498
const2	0.209	0.000	0.407	0.209	0.000	0.407
const3	0.782	1.000	0.413	0.718	1.000	0.450
const4	0.285	0.000	0.451	0.327	0.000	0.469
const5	0.149	0.000	0.356	0.156	0.000	0.363
const6	0.926	1.000	0.262	0.973	1.000	0.162
cai_at	0.038	0.000	0.130	0.569	0.600	0.267
dummy_coll	0.258	0.000	0.438	0.845	1.000	0.362
dummy_collfin	0.232	0.000	0.422	0.999	1.000	0.023
dummy_collfintang	0.086	0.000	0.280	0.599	1.000	0.490
dummy_collfinintang	0.021	0.000	0.143	0.230	0.000	0.421
dummy_collfinrec	0.000	0.000	0.000	1.000	1.000	0.000
dummy_collfininv	0.008	0.000	0.088	0.736	1.000	0.441
dummy_collfincash	0.043	0.000	0.203	0.218	0.000	0.413
wedge_coll	-0.165	-0.135	0.198	0.297	0.315	0.304
undercoll	16.180	0.000	403.737	246.948	6.218	2,341.893

Table 16: Summary statistics for firms pledging account receivables in financial debt

Firms pledging account receivables as collateral have a higher mean age than firms that do not. Firms pledge account receivables only in addition to other types of collateral. Account receivables are more likely to be pledged when the firms become financially constrained.

	Dummy_collfininv					
	0			1		
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
punsec	0.698	0.941	0.369	0.463	0.453	0.357
punsec_at	0.118	0.043	0.152	0.150	0.095	0.166
psec_at	0.049	0.000	0.107	0.148	0.108	0.149
tang	0.203	0.162	0.165	0.287	0.254	0.181
fs	0.757	0.824	0.250	0.585	0.599	0.262
mtb	2.256	1.309	3.893	1.260	0.883	1.315
cashflow_at	-0.069	0.062	0.535	0.022	0.053	0.170
cash_inv_pct	0.254	0.154	0.266	0.010	0.047	0.134
age	10.273	10.000	5.844	10.595	10.000	5.648
lsize	5.299	5.152	2.152	5.063	4.885	1.763
capex_at	0.043	0.030	0.049	0.046	0.032	0.047
ldebt	3.438	3.511	2.951	3.431	3.173	2.291
beta	1.281	1.223	0.332	1.328	1.324	0.308
betaamr	1.163	1.148	1.098	1.010	1.148	1.054
const1	0.419	0.000	0.493	0.582	1.000	0.493
const2	0.209	0.000	0.406	0.215	0.000	0.411
const3	0.780	1.000	0.414	0.735	1.000	0.442
const4	0.285	0.000	0.452	0.329	0.000	0.470
const5	0.149	0.000	0.356	0.161	0.000	0.368
const6	0.925	1.000	0.263	0.992	1.000	0.091
cai_at	0.041	0.000	0.133	0.629	0.673	0.243
dummy_coll	0.265	0.000	0.441	0.853	1.000	0.354
dummy_collfin	0.242	0.000	0.428	0.999	1.000	0.036
dummy_collfintang	0.089	0.000	0.285	0.651	1.000	0.477
dummy_collfinintang	0.021	0.000	0.142	0.273	0.000	0.446
dummy_collfinrec	0.020	0.000	0.141	0.880	1.000	0.325
dummy_collfininv	0.000	0.000	0.000	1.000	1.000	0.000
dummy_collfincash	0.045	0.000	0.208	0.216	0.000	0.412
wedge_coll	-0.162	-0.133	0.200	0.342	0.365	0.299
undercoll	19.005	0.000	436.237	248.339	5.930	2,472.741

Table 17: Summary statistics for firms pledging inventories in financial debt

If firms pledge inventories among other sources of collateral, the value of the collateral will be maximised. The firms pledging this source of collateral have a higher mean age than those which do not pledge inventories. Firms pledging inventories are unlikely to pledge other types of collateral. Firms tend to pledge inventories when they become financially constrained.

| | Dummy_collfincash | | | | | |
| | 0 | | | 1 | | |
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
punsec	0.694	0.936	0.371	0.502	0.501	0.361
punsec_at	0.120	0.044	0.153	0.135	0.071	0.155
psec_at	0.051	0.000	0.109	0.120	0.062	0.143
tang	0.207	0.166	0.167	0.223	0.171	0.172
fs	0.753	0.816	0.252	0.637	0.673	0.269
mtb	2.226	1.286	3.852	1.690	1.092	2.613
cashflow_at	-0.064	0.062	0.532	-0.045	0.041	0.263
cash_inv_pct	0.245	0.143	0.263	0.235	0.141	0.247
age	10.240	10.000	5.782	11.201	11.000	6.595
lsize	5.250	5.104	2.135	5.875	5.766	1.984
capex_at	0.043	0.030	0.049	0.042	0.028	0.050
ldebt	3.400	3.440	2.913	3.934	4.021	2.767
beta	1.281	1.223	0.330	1.341	1.324	0.341
betaamr	1.152	1.148	1.098	1.275	1.148	1.045
const1	0.423	0.000	0.494	0.536	1.000	0.499
const2	0.214	0.000	0.410	0.127	0.000	0.333
const3	0.784	1.000	0.411	0.656	1.000	0.475
const4	0.285	0.000	0.451	0.344	0.000	0.475
const5	0.153	0.000	0.360	0.100	0.000	0.300
const6	0.927	1.000	0.260	0.963	1.000	0.190
cai_at	0.055	0.000	0.168	0.444	0.404	0.306
dummy_coll	0.262	0.000	0.440	0.948	1.000	0.223
dummy_collfin	0.246	0.000	0.430	0.999	1.000	0.026
dummy_collfintang	0.106	0.000	0.308	0.411	0.000	0.492
dummy_collfinintang	0.030	0.000	0.170	0.143	0.000	0.350
dummy_collfinrec	0.060	0.000	0.237	0.283	0.000	0.451
dummy_collfininv	0.050	0.000	0.218	0.235	0.000	0.424
dummy_collfincash	0.000	0.000	0.000	1.000	1.000	0.000
wedge_coll	-.0152	-0.131	0.213	0.221	0.206	0.355
undercoll	19.887	0.000	654.634	253.516	7.056	1,609.120

Table 18: Summary statistics for firms pledging cash in financial debt

Firms pledging cash as collateral, tend to be older than firms that do not. They are more likely to pledge tangible assets than other types of collateral. Firms are less likely to pledge cash when they become financially constrained.

For the similarities and differences, we have seen that age and financially constraints are important factors. Firms pledging tangible and intangible assets tend to be younger than those which do not. Pledging inventories, cash and receivables is more common among older firms. When firms become financially constrained they are more likely to pledge any source of collateral except from cash which is less likely to be pledged.

Punsec		Betaacat			
Tangcat		1	2	3	4
1	Mean	0.723	0.721	0.713	0.736
	Std. Dev.	0.350	0.364	0.362	0.339
	Freq.	694	593	1,106	990
2	Mean	0.707	0.714	0.685	0.672
	Std. Dev.	0.369	0.372	0.359	0.368
	Freq.	1,081	1,168	1,283	1,363
3	Mean	0.685	0.716	0.702	0.626
	Std. Dev.	0.373	0.374	0.372	0.378
	Freq.	1,501	1,283	1,328	1,246
4	Mean	0.648	0.666	0.629	0.598
	Std. Dev.	0.383	0.387	0.378	0.388
	Freq.	1,773	1,328	1,532	1,009

Table 19: Two-way sorting by tangibility category and beta of assets on unsecured debt in debt structure

The table shows that when firms have low collateral volatility and low tangibility, firms have more unsecured debt. If the firms have high collateral volatility and high tangibility, firms have less unsecured debt.

Capex_at		Betaacat			
Tangcat		1	2	3	4
1	Mean	0.015	0.015	0.015	0.017
	Std. Dev.	0.019	0.013	0.038	0.015
	Freq.	1,148	983	2,039	1,806
2	Mean	0.029	0.029	0.031	0.035
	Std. Dev.	0.023	0.021	0.025	0.026
	Freq.	1,446	1,539	1,742	1,904
3	Mean	0.044	0.043	0.051	0.055
	Std. Dev.	0.031	0.028	0.046	0.042
	Freq.	1,842	1,563	1,682	1,559
4	Mean	0.069	0.071	0.080	0.085
	Std. Dev.	0.058	0.054	0.087	0.073
	Freq.	2,048	1,533	1,747	1,195

Table 20: Two-way sorting by tangibility category and beta of assets on capital expenditures to total assets

The table shows that when firms have low tangibility and low collateral volatility, the firms have less capital expenditures. If the firms have high tangibility and high collateral volatility, they have more capital expenditures.

4.3.3 Descriptive statistics of spreads

	Obs	Independent Mean	Std. Dev.	Obs	Secured Mean	Std. Dev.	Obs	Unsecured Mean	Std. Dev.
allindrawn	3,159	170.610	142.103	2,197	243.170	135.638	2,353	107.437	108.119
tang	3,159	0.262	0.161	1,292	0.259	0.166	1,425	0.258	0.153
betaamr	3,159	1.000	1.005	1,292	1.071	1.144	1,425	0.989	0.888
punsec	3,157	0.709	0.364	1,292	0.451	0.349	1,423	0.937	0.196
punsecbetaamr	3,157	0.707	0.822	1,292	0.516	0.783	1,423	0.895	0.838
cai_at	3,159	0.104	0.225	1,292	0.195	0.284	1,425	0.021	0.101
lsize	3,159	6.561	1.881	1,292	5.549	1.581	1,425	7.314	1.720
ldebt	3,159	4.970	2.304	1,292	3.962	2.170	1,425	5.660	2.148
cashflow_at	3,055	0.064	0.122	1,245	0.038	0.164	1,382	0.085	0.076
mtb	3,112	1.518	1.551	1,263	1.465	1.860	1,416	1.575	1.076
lmat	3,020	3.542	0.718	2,121	3.615	0.668	2,286	3.496	0.768
lamount	3,159	18.280	1.761	2,197	17.166	1.765	2,353	18.881	1.600
revolving	3,159	0.740	0.438	2,197	0.633	0.482	2,353	0.836	0.370
termloan	3,159	0.215	0.411	2,197	0.318	0.466	2,353	0.122	0.328
dummy_secured	3,159	0.409	0.492	2,197	1.000	0.000	2,353	0.000	0.000
dummy_coll	3,159	0.408	0.491	1,292	0.678	0.467	1,425	0.140	0.347
dummy_collfin	3,159	0.403	0.491	1,292	0.711	0.453	1,425	0.110	0.313
dummy_collfintang	3,159	0.158	0.365	1,292	0.293	0.455	1,425	0.032	0.177
dummy_collfinintang	3,159	0.057	0.232	1,292	0.115	0.320	1,425	0.007	0.084
dummy_collfinrec	3,159	0.113	0.317	1,292	0.208	0.406	1,425	0.028	0.165
dummy_collfininv	3,159	0.093	0.291	1,292	0.182	0.386	1,425	0.015	0.121
dummy_collfincash	3,159	0.066	0.247	1,292	0.122	0.327	1,425	0.017	0.129
dummy_coll_old	3,159	0.536	0.499	1,292	0.678	0.467	1,425	0.423	0.494
dummy_collfin_old	3,159	0.485	0.500	1,292	0.711	0.453	1,425	0.293	0.455
dummy_collfintang_old	3,159	0.183	0.386	1,292	0.293	0.455	1,425	0.086	0.281
dummy_collfinintang_old	3,159	0.066	0.249	1,292	0.115	0.320	1,425	0.028	0.165
dummy_collfinrec_old	3,159	0.136	0.343	1,292	0.208	0.406	1,425	0.079	0.269
dummy_collfininv_old	3,159	0.113	0.316	1,292	0.182	0.386	1,425	0.058	0.233
dummy_collfincash_old	3,159	0.082	0.275	1,292	0.122	0.327	1,425	0.054	0.226
cai_at	3,159	0.104	0.225	1,292	0.195	0.284	1,425	0.021	0.101
undercoll	3,159	23.513	404.876	1,292	19.904	112.600	1,425	16.630	389.774
wedge_coll	3,159	-0.158	0.264	1,292	-0.064	0.307	1,425	-0.237	0.183

Table 21: Summary statistics for spreads on secured versus unsecured contracts

The mean value of the spreads on secured contracts is more than twice as high compared to the mean value of the spreads for unsecured contracts. The secured contracts contain higher mean value of collateral volatility than for unsecured contracts. Smaller firms tend to have secured debt contracts. Firms have less total debt when they have secured contracts.

Allindrawn			Betaacat		
Tangcat		1	2	3	4
1	Mean	237.031	222.724	187.500	277.647
	Std. Dev.	167.720	119.770	111.096	215.592
	Freq.	61	49	45	68
2	Mean	181.247	174.451	180.021	192.571
	Std. Dev.	153.966	127.036	145.357	135.056
	Freq.	221	219	135	229
3	Mean	138.956	148.866	165.732	195.741
	Std. Dev.	115.332	136.192	147.799	135.450
	Freq.	337	276	183	214
4	Mean	149.710	141.641	177.149	194.530
	Std. Dev.	140.797	121.792	140.906	165.456
	Freq.	400	333	187	202

Table 22: Two-way sorting by tangibility categories and beta of assets on spreads

When high tangibility and low collateral volatility, the mean values of spreads are low. When low tangibility, independent of low or high collateral volatility, the mean values of spreads are high. As firms with low collateral volatility borrow unsecured debt, unsecured debt has low spreads.

| Allindrawn | | Secured | | | | Unsecured | | | |
| | | Betaacat | | | | Betaacat | | | |
Tangcat		1	2	3	4	1	2	3	4
1	Mean	265.800	268.479	227.917	352.143	209.556	202.632	134.853	235.909
	Std. Dev.	145.971	103.296	115.372	200.372	208.328	113.680	84.305	221.745
	Freq.	25	24	24	28	25	19	17	33
2	Mean	232.531	231.957	233.251	238.349	125.139	135.375	113.264	142.548
	Std. Dev.	141.007	100.828	162.380	129.748	111.982	121.649	89.210	133.479
	Freq.	91	89	73	114	99	100	53	94
3	Mean	222.487	237.394	238.221	246.023	88.322	98.066	124.249	139.006
	Std. Dev.	103.356	142.154	143.150	112.493	95.160	103.312	134.159	112.828
	Freq.	111	90	60	110	170	145	99	82
4	Mean	246.856	223.454	266.425	266.316	79.800	92.667	119.156	117.899
	Std. Dev.	148.412	130.274	139.283	179.002	77.164	80.208	100.865	110.364
	Freq.	155	122	76	100	176	162	77	74

Table 23: Three-way sorting by tangibility categories and beta of assets on spreads, when making distinction between secured and unsecured contracts

The mean values of spreads on secured contracts are overall higher compared to the spreads on the unsecured contracts.

5. Regression analysis

5.1 Definition of dependent variables

Punsec: *Unsecured debt standardized by total debt (long-term and short-term debt).*

Punsec_at: *Unsecured debt standardized by total assets.*

Psec_at: *Secured debt standardized by total assets.*

Capex_at: *A variable we created by standardizing capital expenditures by total assets.*

Allindrawn: *Measure of spreads. It is defined as the basis point coupon spread over LIBOR plus the upfront and annual fee, spread over the loan maturity.*

5.2 Debt structure regressions

VARIABLES	punsec	punsec	punsec_at	punsec_at	psec_at	psec_at
Tangibility	-0.240***		0.0480**		0.121***	
	(0.0662)		(0.0211)		(0.0164)	
Asset Beta wrt Market Return	-0.00827**	-0.00736**	-0.00449***	-0.00450***	-0.000852	-0.00114
	(0.00352)	(0.00348)	(0.00113)	(0.00113)	(0.000810)	(0.000792)
lsize	0.0194*	0.0176*	0.0274***	0.0269***	0.00648***	0.00615***
	(0.00994)	(0.00953)	(0.00342)	(0.00343)	(0.00236)	(0.00234)
CF over Total Assets	-0.0279*	-0.0203	-0.0384***	-0.0395***	-0.00480*	-0.00755***
	(0.0169)	(0.0166)	(0.00533)	(0.00540)	(0.00248)	(0.00246)
Market-to-book, Investment Opportunities Proxy	-0.00194	-0.00153	-0.00297***	-0.00306***	-0.000984***	-0.00115***
	(0.00189)	(0.00193)	(0.000579)	(0.000581)	(0.000251)	(0.000246)
cai_at		-0.287***		-0.0121		0.0894***
		(0.0223)		(0.00811)		(0.00707)
Constant	0.632***	0.599***	-0.0231	-0.00812	-0.00172	0.0246**
	(0.0575)	(0.0495)	(0.0178)	(0.0172)	(0.0128)	(0.0117)
Observations	17,598	17,598	21,845	21,845	23,098	23,098
R-squared	0.621	0.632	0.647	0.647	0.636	0.644
Clustered SE	Firm	Firm	Firm	Firm	Firm	Firm
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 24: Regression on debt structure when using tangibility or the collateral absorption index as controls

Collateral volatility has a statistical significant negative effect on the debt structure, i.e. the level of unsecured debt. The effect is significant regardless of if you use *tang* or *cai_at* as controls. Thus, a 1% increase in the collateral volatility generates a decrease of 0.00827% or 0.00736% dependent on if you use *tang* or *cai_at* as controls. Therefore, firms with higher collateral volatility have lower level of unsecured debt in their debt structure, all other factors held equal. Firms with high collateral volatility will have lower access to unsecured debt, and must substitute towards secured debt.

VARIABLES	Punsec const1=0	const1=1	const2=0	const2=1	const3=0	const3=1	const4=0	const4=1	const5=0	const5=1	const6=0	const6=1	const1=0	const1=1	const2=0	const2=1	const3=0	const3=1
Tangibility	-0.183**	-0.292***	-0.156**	-0.379**	-0.117	-0.298***	-0.229***	-0.237	-0.171**	-0.329	0.123	-0.259***						
	(0.0895)	(0.110)	(0.0745)	(0.157)	(0.119)	(0.0789)	(0.0806)	(0.166)	(0.0716)	(0.200)	(0.0829)	(0.0700)						
Asset Beta wrt Market Return	-0.00183	-0.0112*	-0.00618	-0.0109	-0.00150	-0.0117***	-0.00643	-0.0157	-0.00486	-0.0180*	-0.000337	-0.00835**	-0.000450	-0.0106*	-0.00576	-0.00880	-0.00105	-0.0106***
	(0.00497)	(0.00586)	(0.00407)	(0.00795)	(0.00630)	(0.00406)	(0.00419)	(0.00975)	(0.00406)	(0.0108)	(0.00470)	(0.00368)	(0.00494)	(0.00580)	(0.00403)	(0.00794)	(0.00641)	(0.00401)
lsize	0.0374**	-0.0115	0.0411***	-0.0594**	0.0312	0.00984	0.0186	0.0174	0.0381***	-0.0629*	0.00772	0.0197*	0.0378***	-0.0120	0.0380***	-0.0575**	0.0292	0.00705
	(0.0150)	(0.0140)	(0.0123)	(0.0261)	(0.0214)	(0.0121)	(0.0127)	(0.0199)	(0.0113)	(0.0350)	(0.0129)	(0.0105)	(0.0140)	(0.0140)	(0.0116)	(0.0265)	(0.0201)	(0.0117)
CF over Total Assets	-0.0539	-0.0177	0.0758*	-0.0137	0.0171	-0.0258	-0.00123	-0.0308	-0.00575	-0.00537	-0.0327	-0.0295*	-0.0590*	-0.00142	0.0662*	0.00377	-0.00272	-0.0133
	(0.0348)	(0.0222)	(0.0417)	(0.0213)	(0.104)	(0.0177)	(0.0420)	(0.0234)	(0.0327)	(0.0278)	(0.0675)	(0.0173)	(0.0355)	(0.0214)	(0.0402)	(0.0211)	(0.103)	(0.0173)
Market-to-book, Investment Opportunities Proxy	-0.00236	-0.00135	-0.00560*	-0.00300	0.00770	-0.00240	-0.00299	-0.000864	-0.00297	-0.00258	-0.00183	-0.00197	-0.00293	-0.000386	-0.00502	-0.00210	0.00848*	-0.00193
	(0.00396)	(0.00273)	(0.00330)	(0.00237)	(0.00493)	(0.00201)	(0.00538)	(0.00317)	(0.00319)	(0.00323)	(0.00614)	(0.00194)	(0.00388)	(0.00277)	(0.00353)	(0.00232)	(0.00472)	(0.00207)
cal_at													-0.302***	-0.247***	-0.300***	-0.225***	-0.240***	-0.287***
													(0.0373)	(0.0302)	(0.0260)	(0.0472)	(0.0419)	(0.0260)
Constant	0.570***	0.698***	0.499***	0.846***	0.608***	0.650***	0.652***	0.574***	0.520***	0.857***	0.871***	0.611***	0.534***	0.654***	0.496***	0.775***	0.598***	0.614***
	(0.0983)	(0.0707)	(0.0781)	(0.0895)	(0.182)	(0.0591)	(0.0780)	(0.101)	(0.0691)	(0.122)	(0.120)	(0.0570)	(0.0829)	(0.0639)	(0.0671)	(0.0808)	(0.154)	(0.0520)
Observations	9,680	7,918	14,472	3,126	4,633	12,965	13,784	3,814	15,329	2,269	1,466	16,132	9,680	7,918	14,472	3,126	4,633	12,965
R-squared	0.686	0.659	0.641	0.652	0.730	0.602	0.643	0.741	0.640	0.694	0.732	0.600	0.696	0.666	0.654	0.656	0.740	0.613
Clustered SE	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Firm FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE

Yes

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

const4=0	const4=1	const5=0	const5=1	const6=0	const6=1	const1=0	const1=1	const2=0	const2=1	const3=0	const3=1	const4=0	const4=1	const5=0	const5=1	const6=0	const6=1	const1=0	const1=1
						Punsec_at													
-0.00478	-0.0156	-0.00465	-0.0167	0.000170	-0.00744**	-0.00251	0.0837**	0.0264	0.0948**	-0.121**	0.0759***	0.0270	0.0344	0.0289	0.0931	-0.00349	0.0558**	-0.00365**	-0.00577***
(0.00417)	(0.00958)	(0.00400)	(0.0108)	(0.00484)	(0.00363)	(0.0323)	(0.0344)	(0.0258)	(0.0458)	(0.0599)	(0.0222)	(0.0195)	(0.0579)	(0.0239)	(0.0589)	(0.0849)	(0.0218)	(0.00170)	(0.00170)
0.0142	0.0180	0.0354***	-0.0660*	0.000106	0.0178*	-0.00370**	-0.00568***	-0.00415***	-0.00355	-0.00617	-0.00452***	-0.00393***	-0.00430	-0.00396***	-0.00615**	-0.00594	-0.00441***	0.0341***	0.0227***
(0.0119)	(0.0199)	(0.0108)	(0.0358)	(0.0129)	(0.0101)	(0.00170)	(0.00170)	(0.00139)	(0.00219)	(0.00375)	(0.00117)	(0.000989)	(0.00365)	(0.00134)	(0.00272)	(0.00423)	(0.00116)	(0.00527)	(0.00478)
0.00991	-0.0221	-0.00734	0.0108	0.00135	-0.0207	0.0341***	0.0233***	0.0382***	0.00608	0.0132	0.0215***	0.0251***	0.0256***	0.0342***	0.00528	0.0329*	0.0268***	-0.0435***	-0.0335***
(0.0408)	(0.0228)	(0.0321)	(0.0275)	(0.0589)	(0.0169)	(0.00528)	(0.00474)	(0.00437)	(0.00928)	(0.0105)	(0.00385)	(0.00324)	(0.00903)	(0.00396)	(0.0114)	(0.0187)	(0.00353)	(0.00984)	(0.00723)
-0.00318	-0.000508	-0.00281	-0.00172	-0.00240	-0.00152	-0.0434***	-0.0313***	-0.109***	-0.0124**	-0.149	-0.0309***	-0.0480***	-0.0188**	-0.0771***	-0.0128**	-0.363***	-0.0370***	-0.00560***	-0.00169**
(0.00512)	(0.00317)	(0.00333)	(0.00314)	(0.00631)	(0.00198)	(0.00983)	(0.00703)	(0.0162)	(0.00576)	(0.114)	(0.00504)	(0.00879)	(0.00694)	(0.0116)	(0.00650)	(0.105)	(0.00530)	(0.00128)	(0.000702)
-0.336***	-0.176***	-0.300***	-0.163***	-0.0786**	-0.288***	-0.00556***	-0.00159**	-0.00583***	-0.000860	-0.00930*	-0.00245***	-0.00739***	-0.00320***	-0.00466***	-0.00133	-0.0176***	-0.00274***	-0.0187	-0.00566
(0.0282)	(0.0446)	(0.0255)	(0.0560)	(0.0382)	(0.0226)	(0.00128)	(0.000698)	(0.00119)	(0.000701)	(0.00550)	(0.000549)	(0.00135)	(0.000937)	(0.000980)	(0.000962)	(0.00586)	(0.000576)	(0.0126)	(0.0124)
0.635***	0.533***	0.511***	0.837***	0.975***	0.576***	-0.0417	-0.0173	-0.0714***	0.0407	0.210**	-0.0125	-0.0157	0.0376	-0.0514**	0.0410	0.0168	-0.0225	-0.0411	0.00420
(0.0646)	(0.0946)	(0.0602)	(0.115)	(0.113)	(0.0493)	(0.0305)	(0.0233)	(0.0252)	(0.0283)	(0.0868)	(0.0174)	(0.0176)	(0.0438)	(0.0221)	(0.0338)	(0.180)	(0.0174)	(0.0291)	(0.0223)
13,784	3,814	15,329	2,269	1,466	16,132	11,602	10,243	17,241	4,604	4,695	17,150	17,244	4,601	18,455	3,390	1,474	20,371	11,602	10,243
0.657	0.745	0.653	0.695	0.732	0.612	0.717	0.684	0.669	0.635	0.676	0.594	0.715	0.746	0.668	0.673	0.745	0.630	0.717	0.683
Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE

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	const2=0	const2=1	const3=0	const3=1	const4=0	const4=1	const5=0	const5=1	const6=0	const6=1	Psec_at const1=0	const1=1	const2=0	const2=1	const3=0	const3=1	const4=0	const4=1	const5=0	const5=1
	-0.00414***	-0.00374*	-0.00610	-0.00457***	-0.00384***	-0.00448	-0.00397***	-0.00626**	-0.00596	-0.00443***	0.0971***	0.138***	0.0933***	0.171***	0.0417	0.144***	0.104***	0.138***	0.103***	0.157***
	(0.00139)	(0.00218)	(0.00376)	(0.00117)	(0.000991)	(0.00363)	(0.00134)	(0.00272)	(0.00425)	(0.00116)	(0.0222)	(0.0282)	(0.0193)	(0.0376)	(0.0406)	(0.0184)	(0.0168)	(0.0510)	(0.0177)	(0.0452)
	0.0376***	0.0525	0.0159	0.0210***	0.0246***	0.0255***	0.0338***	0.00407	0.0330*	0.0263***	-0.00213**	-0.000102	-0.00123	0.00162	0.00102	-0.000774	-0.00107	0.00555**	-0.00145	0.00299
	(0.00436)	(0.00933)	(0.0104)	(0.00386)	(0.00323)	(0.00903)	(0.00396)	(0.0116)	(0.0172)	(0.00354)	(0.00102)	(0.00135)	(0.000911)	(0.00186)	(0.00225)	(0.000862)	(0.000735)	(0.00277)	(0.000896)	(0.00268)
	-0.111***	-0.0144**	-0.142	-0.0327***	-0.0486***	-0.0194***	-0.0787***	-0.0150**	-0.364***	-0.0384***	0.00503	0.00917***	0.00415	0.00614	-0.00455	0.00783***	0.00729***	0.000510	0.00550*	0.00433
	(0.0162)	(0.00566)	(0.122)	(0.00516)	(0.00879)	(0.00693)	(0.0116)	(0.00623)	(0.108)	(0.00539)	(0.00322)	(0.00319)	(0.00311)	(0.00433)	(0.00782)	(0.00251)	(0.00240)	(0.00554)	(0.00281)	(0.00529)
	-0.00591***	-0.000948	-0.00880	-0.00257***	-0.00761***	-0.00322***	-0.00474***	-0.00147	-0.0176***	-0.00284***	-0.00917***	-0.00349	-0.0490***	0.00376	0.0105	-0.00493**	-0.0141***	0.00847**	-0.0194***	0.00564
	(0.00120)	(0.000705)	(0.00560)	(0.000553)	(0.00136)	(0.000939)	(0.000985)	(0.000967)	(0.00583)	(0.000578)	(0.00322)	(0.00317)	(0.0128)	(0.00271)	(0.0770)	(0.00237)	(0.00509)	(0.00426)	(0.00709)	(0.00363)
	-0.0211**	0.0109	-0.0393**	-0.00317	-0.0211***	-0.0243	-0.0196**	0.0143	0.00368	-0.0117	-0.00152***	-0.000815**	-0.00143***	-0.000350	-0.00332*	-0.000887***	-0.00300***	-0.000915**	-0.00153***	-0.000123
	(0.00934)	(0.0196)	(0.0193)	(0.00851)	(0.00763)	(0.0210)	(0.00906)	(0.0242)	(0.0718)	(0.00819)	(0.000416)	(0.000373)	(0.000440)	(0.000327)	(0.00174)	(0.000256)	(0.000695)	(0.000442)	(0.000394)	(0.000505)
	-0.0601**	0.0586**	0.152*	0.00634	-0.00492	0.0481	-0.0403*	0.0561	0.0140	-0.00621	-0.00773	0.0100	0.0156	0.00854	0.0820	-0.00497	-0.0142	0.0748***	0.00591	0.0149
	(0.0241)	(0.0285)	(0.0810)	(0.0170)	(0.0165)	(0.0433)	(0.0211)	(0.0350)	(0.152)	(0.0169)	(0.0201)	(0.0155)	(0.0186)	(0.0155)	(0.0645)	(0.0117)	(0.0139)	(0.0270)	(0.0162)	(0.0187)
	17,241	4,604	4,695	17,150	17,244	4,601	18,455	3,390	1,474	20,371	12,484	10,614	18,404	4,694	5,332	17,766	18,357	4,741	19,651	3,447
	0.669	0.633	0.675	0.592	0.715	0.746	0.669	0.671	0.745	0.629	0.687	0.711	0.654	0.682	0.713	0.648	0.638	0.792	0.648	0.726
	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE

	const6=0	const6=1	const1=0	const1=1	const2=0	const2=1	const3=0	const3=1	const4=0	const4=1	const5=0	const5=1	const6=0	const6=1
	-0.0133	0.127***												
	(0.0175)	(0.0172)												
	0.00174	-0.00100	-0.00236**	-0.000338	-0.00141	0.000932	0.000852	-0.00106	-0.00139*	0.00547**	-0.00159*	0.00257	0.00168	-0.00129
	(0.00212)	(0.000840)	(0.00103)	(0.00132)	(0.000895)	(0.00185)	(0.00227)	(0.000844)	(0.000721)	(0.00273)	(0.000881)	(0.00263)	(0.00217)	(0.0008820)
	-0.00646	0.00718***	0.00417	0.00836***	0.00414	0.00416	-0.00440	0.00768***	0.00732***	-0.000147	0.00553**	0.00263	-0.00578	0.00688***
	(0.00553)	(0.00247)	(0.00308)	(0.00323)	(0.00303)	(0.00455)	(0.00745)	(0.00247)	(0.00230)	(0.00567)	(0.00276)	(0.00553)	(0.00608)	(0.00245)
	-0.0113	-0.00495*	-0.00977***	-0.00750***	-0.0485***	-4.98e-05	0.0137	-0.00851***	-0.0168***	0.00513	-0.0210***	0.00160	-0.0153	-0.00792***
	(0.0162)	(0.00254)	(0.00324)	(0.00317)	(0.0122)	(0.00246)	(0.0714)	(0.00237)	(0.00518)	(0.00403)	(0.00693)	(0.00301)	(0.0157)	(0.00252)
	-0.000249	-0.0009973***	-0.00157***	-0.00103***	-0.00166***	-0.000551*	-0.00371**	-0.00107***	-0.00324***	-0.00105**	-0.00167***	-0.000398	-0.000225	-0.00115***
	(0.000438)	(0.0002256)	(0.000407)	(0.000370)	(0.000448)	(0.000314)	(0.00163)	(0.000253)	(0.0006887)	(0.000440)	(0.000387)	(0.000484)	(0.000422)	(0.000252)
	0.0889***		0.0889***	0.0809***	0.0904***	0.0818***	0.103***	0.0806***	0.0827***	0.0780***	0.0919***	0.0631***	0.0254**	0.0893***
	(0.0120)		(0.0120)	(0.00951)	(0.00827)	(0.0145)	(0.0183)	(0.00736)	(0.00764)	(0.0191)	(0.00813)	(0.0172)	(0.0117)	(0.00716)
	0.0636	0.00137	0.0192	0.0375**	0.0352**	0.0395***	0.0893	0.0222**	0.00813	0.101***	0.0269*	0.0362*	0.0539	0.0273**
	(0.0416)	(0.0126)	(0.0174)	(0.0147)	(0.0169)	(0.0146)	(0.0568)	(0.0106)	(0.0118)	(0.0262)	(0.0149)	(0.0188)	(0.0481)	(0.0116)
	1,786	21,312	12,484	10,614	18,404	4,694	5,332	17,766	18,357	4,741	19,651	3,447	1,786	21,312
	0.693	0.633	0.695	0.715	0.664	0.680	0.724	0.652	0.648	0.794	0.657	0.723	0.694	0.641
	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE

Table 25: Regression on debt structure by financial constraints

We will now analyse the impact of collateral availability on unsecured debt over total debt when firms are constrained and unconstrained. Collateral availability is measured by *tang* and *cai_at*. If the firm is constrained, an increase in tangibility will decrease the unsecured debt in the debt structure more than for unconstrained firms. The significance on the effects varies from significant at the one percent level, to not significant at the ten percent level. If the firm is constrained, an increase in the collateral value will not necessary have a higher decreasing effect on the

unsecured debt over total debt. The effects are significant at both the one and five percent level.

We will now look into how collateral volatility impact unsecured debt over total debt when firms are constrained and unconstrained. Collateral volatility is measured by *betaamr*. If the collateral volatility increases, the reduction in constrained firms' unsecured debt holdings will be higher than for unconstrained firms. The significance level on the effects varies from significant at the one percent level to not significant at the ten percent level.

In the light of our results on financial constraints in the summary statistics, the relationship between volatility and unsecured debt may become clearer. Constrained firms seem to have higher collateral volatility and thus less unsecured debt.

It could be that:
- firms with low collateral volatility and high creditworthiness, borrow unsecured debt.
- firms with high collateral volatility and low creditworthiness, borrow secured debt.

5.3 Investment regressions

VARIABLES	capex_at
Percentage of Total Debt Unsecured	0.00352*
	(0.00195)
Asset Beta wrt Market Return	0.00241***
	(0.000761)
punsecbetaamr	-0.00205**
	(0.00101)
Tangibility	0.182***
	(0.0135)
lsize	0.00163
	(0.00124)
CF over Total Assets	0.000534
	(0.00503)
Market-to-book, Investment Opportunities Proxy	0.00175***
	(0.000382)
Constant	0.00411
	(0.00759)
Observations	17,598
R-squared	0.619
Clustered SE	Firm
Firm FE	Yes FE
Yes	

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 26: Regression on capital expenditures

For the regressions on the investments, we used *capex_at* as a measurement of the investments. In this regression, we have constructed an interaction term between unsecured debt over total debt and the collateral volatility, *punsecbetaamr*. Thus, the effect of *punsec* on *capex_at* depends on *betaamr* and the effect of *betaamr* on *capex_at* depends on *punsec*.

Since we should interpret this regression with an interaction term, we introduce the term of unique effects. By unique effects, we mean the effect from one of the two independent variables *punsec* or *betaamr* on *capex_at*, if one of the two independent variables are equal to zero.

There is a unique statistical significant positive effect of *punsec* on *capex_at*. A 1% increase in unsecured debt over total debt, generates a 0.00352% increase in capital expenditures. There is a unique statistical significant positive effect of *betaamr* on *capex_at*. A unit increase in collateral volatility, generates a 0.00241% increase in capital expenditures. Finally, there is a negative statistical significant effect from the interaction term *punsecbetaamr* on *capex_at*. A 1% increase in *punsec* or a unit increase in *betaamr* generates a decrease of 0.00205% in capital expenditures, in addition to its own coefficient.

The results show that firms with more unsecured debt invest more. The same applies to firms with higher collateral volatility. This is an interesting result. A possible explanation of the regression result can be that firms which invest in riskier assets, also do overinvestments. However, the results show that firms with high level of unsecured debt and high collateral volatility, invest less.

VARIABLES	Capex_at const1=0	const1=1	const2=0	const2=1	const3=0	const3=1	const4=0	const4=1	const5=0	const5=1	const6=0	const6=1
Percentage of Total Debt Unsecured	0.00119	0.00549	0.00354	-0.00109	0.00523	0.00356	0.00330	0.00604	0.00444**	0.00300	0.0129	0.00375*
	(0.00262)	(0.00365)	(0.00216)	(0.00527)	(0.00385)	(0.00227)	(0.00214)	(0.00733)	(0.00217)	(0.00579)	(0.00907)	(0.00199)
Asset Beta wrt Market Return	0.00219*	0.00241**	0.00291***	-0.000328	0.00392*	0.00239***	0.00204**	0.00128	0.00291***	0.000652	0.00677	0.00242***
	(0.00120)	(0.00114)	(0.000899)	(0.00168)	(0.00201)	(0.000857)	(0.000865)	(0.00201)	(0.000919)	(0.00209)	(0.00887)	(0.000768)
punsecbetaamr	-0.00148	-0.00212	-0.00261**	0.000888	-0.00343	-0.00220*	-0.00180	-0.00147	-0.00247**	-0.000600	-0.00718	-0.00209**
	(0.00146)	(0.00167)	(0.00118)	(0.00235)	(0.00214)	(0.00119)	(0.00111)	(0.00282)	(0.00120)	(0.00293)	(0.00861)	(0.00104)
Tangibility	0.175***	0.193***	0.177***	0.172***	0.134***	0.194***	0.168***	0.228***	0.187***	0.159***	0.101***	0.187***
	(0.0166)	(0.0259)	(0.0119)	(0.0438)	(0.0167)	(0.0169)	(0.0114)	(0.0498)	(0.0123)	(0.0449)	(0.0217)	(0.0143)
lsize	0.00166	0.00137	0.000611	0.0128***	-0.000391	0.00342**	0.00153	0.00122	0.000247	0.0142***	-0.00131	0.00199*
	(0.00150)	(0.00199)	(0.00120)	(0.00453)	(0.00216)	(0.00136)	(0.00123)	(0.00420)	(0.00127)	(0.00499)	(0.00427)	(0.00120)
CF over Total Assets	-0.000104	-0.00247	0.0170***	-0.00992	0.0509***	-0.000831	0.00744	-0.00516	0.00445	-0.0134	0.0942***	0.000533
	(0.00648)	(0.00759)	(0.00562)	(0.00887)	(0.0132)	(0.00530)	(0.00574)	(0.0100)	(0.00587)	(0.0118)	(0.0358)	(0.00507)
Market-to-book, Investment Opportunities Proxy	0.00230***	0.00140***	0.00235***	0.000942*	0.00204**	0.00167***	0.00329***	0.00102*	0.00235***	0.00145*	0.00180	0.00174***
	(0.000685)	(0.000517)	(0.000577)	(0.000527)	(0.000819)	(0.000402)	(0.000660)	(0.000564)	(0.000558)	(0.000786)	(0.00145)	(0.000390)
Constant	0.00283	0.00780	0.00812	-0.0136	0.0101	-0.000713	0.00531	0.00586	0.00686	-0.0432**	0.0179	0.00335
	(0.0106)	(0.0111)	(0.00820)	(0.0165)	(0.0187)	(0.00777)	(0.00776)	(0.0228)	(0.00791)	(0.0204)	(0.0417)	(0.00723)
Observations	9,680	7,918	14,472	3,126	4,633	12,965	13,784	3,814	15,329	2,269	1,466	16,132
R-squared	0.682	0.664	0.634	0.684	0.675	0.630	0.629	0.744	0.654	0.718	0.741	0.620
Clustered SE	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Firm FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE	Yes FE

Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 27: Regression on capital expenditures by financial constraints

When constrained by *const1*, the investments become more sensitive to changes in unsecured debt. When constrained by *const2*, the firms' investment sensitivity changes. When constrained by *const3*, the firms' investment become less sensitive to changes in unsecured debt. When constrained by *const4*, the firms' investment sensitivity changes. When constrained by *const5*, the firms' investment become less sensitive to changes in unsecured debt. When constrained by *const6*, the firms' investments become less sensitive to changes in unsecured debt.

The conclusions have been derived by looking at changes in the percentage of total debt unsecured and the interaction between the unsecured debt and the volatility of the firm's assets. When firms become constrained by *const1*, the investments seem to be more sensitive to changes in unsecured debt. At first glance when analysing the effect of *const2*, the effect seems to change from positive to negative impact on the investment. However, this effect is depressed by the interaction term. For constraints 3-6, their impacts are that changes to unsecured debt will make the investments less sensitive.

Overall, merging these results with the findings found in the summary statistics on financial constraints, the conclusion can be extended further. The trend seems to be that for constrained firms, which are typically younger and have less unsecured debt in their debt structure, capital expenditures react less sensitive to changes in unsecured debt.

5.4 Spreads regressions

VARIABLES	Allindrawn Independent dummy_secured	Allindrawn dummy_secured=1	Allindrawn dummy_secured=0
Tangibility	-48.49	-91.27	-28.14
	(72.33)	(138.2)	(80.45)
Asset Beta wrt Market Return	-1.751	-2.089	-1.403
	(11.64)	(19.61)	(41.78)
Percentage of Total Debt Unsecured	-52.24**	-22.10	-84.87**
	(23.33)	(63.58)	(41.27)
punsecbetaamr	15.52	6.315	11.69
	(14.33)	(35.98)	(44.13)
cai_at	-22.12	2.571	-60.66
	(23.63)	(39.09)	(51.51)
lsize	-51.28***	-44.79*	-46.94**
	(13.78)	(24.58)	(19.06)
ldebt	12.97**	14.29	15.79*
	(5.777)	(10.82)	(8.994)
CF over Total Assets	-263.9***	-134.6	-346.0**
	(76.37)	(85.64)	(154.0)
Market-to-book, Investment Opportunities Proxy	3.436	6.066	2.903
	(4.265)	(8.310)	(7.251)
Log of Maturity of Facility	-11.20*	-36.34	-0.197
	(6.678)	(23.55)	(6.215)
Log of Facility Amount	-10.73**	-0.338	-18.27**
	(5.387)	(10.88)	(7.185)
Dummy Revolving Credit	1.500	9.427	-14.32
	(24.17)	(46.82)	(30.34)
Dummy Term Loans	33.70	63.39	-4.982
	(26.75)	(50.87)	(35.81)
dummy_secured	49.48***		
	(11.68)		
Constant	641.1***	554.0***	764.5***
	(122.9)	(204.3)	(179.6)
Observations	2,879	1,186	1,693
R-squared	0.762	0.791	0.767
Clustered SE	Firm	Firm	Firm
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 28: Regression on spreads for secured versus unsecured debt contracts

As the share of unsecured debt in the debt structure increases, the spreads decreases. Hence, it seems to be lower spreads for unsecured debt contracts. When testing whether this is due to lower risk, we see that *betaamr* do not have a statistical significant effect on the spreads. Hence, collateral volatility is not the cause. Either the measure of collateral volatility does not measure risk properly, or bank debt does not respond to the risk as much as we would ex-ante think.

As the interaction term is not statistical significant, it confirms our remark that collateral volatility, or the riskiness of assets, does not play a role per the data we have available. From before, we know that firms which are financially constrained, have less unsecured debt, are younger and riskier. The reason for this relationship could be that firms with secured debt are financially constrained while firms with unsecured debt are not. It is reasonable to think that firms that are not financially constrained have higher creditworthiness. Thus, risk is not the explanation for more unsecured debt and lower spreads. Then, higher creditworthiness could be the reason that firms with more unsecured debt in their debt structure have lower spreads.

6. Conclusion, limitations and further research

6.1 Conclusion

From the summary statistics, we see that firms borrow more unsecured than secured debt, less than 1/3 of the firms pledge collateral in financial debt contracts and that available collateral is not exhausted.

Our first hypothesis is that secured debt is used by firms with high asset volatility. We see from the summary statistics on debt structure that firms with only secured debt in their debt structure have higher collateral volatility than firms borrowing only unsecured. These results are supported by the summary statistics done on the investments and the collateral. The two-way sorting shows that firms with low volatility and tangibility have high levels of unsecured debt, while high volatility and tangibility give lower levels of unsecured debt. The regression on debt structure shows that collateral volatility has a statistical significant effect on debt structure, i.e. unsecured debt. We can also see that constrained firms' unsecured debt holdings are more sensitive to changes in collateral volatility than unconstrained firms.

The second hypothesis about borrowing dynamics relates much to the first hypothesis. As mentioned, firms with high asset volatility tend to have more secured debt in their debt structure. However, a situation where a firm has little collateral should imply that it is financially constrained and thus has low leverage. This implication is evident in our results. On the other hand, this implies that firms with high asset volatility and high level of collateral issue secured debt. Our results also show that firms with low asset betas borrow unsecured debt. Thus, firms should have available collateral which can be used to increase their debt capacity in the future.

The third hypothesis is that asset volatility directly maps into interest rates on debt contracts. Thus, unsecured debt is cheaper as it is lent to low asset volatility firms. From the summary statistics on spreads, we see that secured contracts have higher spreads and volatility. However, from the two-way sorting by tangibility and volatility on spreads, the volatility does not seem to play a major role on spreads. When making a distinction between secured and unsecured contracts, we clearly see that unsecured contracts have lower spreads than secured contracts. The

regression on spreads disconfirms that this is due to collateral volatility. Collateral volatility does not have a statistical significant effect on the spreads of the contract, and hence risk is not the cause for more unsecured debt and lower spreads. We should look to other factors when we try to assess what causes lower spreads. As discussed earlier, firms with high levels of unsecured debt have higher creditworthiness as they are not financially constrained. Therefore, creditworthiness is a more important element than collateral volatility when borrowing.

6.2 Limitations

Our analysis is performed by using a sample which contains data on U.S. public manufacturing firms. We are not concerned about the internal validity. However, the sample selection may affect the external validity in the sense that our conclusions cannot be generalized to i.e. Norwegian public manufacturing firms. It might be that U.S. public manufacturing firms have important different characteristics compared to European. Eventual further research on the topic will reveal this.

6.3 Further research

This area within capital structure is comprehensive and many interesting areas are yet to be explored. As this master thesis is limited by time, we want to encourage others with passion for capital structure to continue the research on the area. If we had time, we would have added another hypothesis about collateralized assets. More precise, if collateralized assets have a lower asset volatility, spare collateral capacity is likely to have a high asset volatility if overall asset volatility is high. We did not get to the point of decomposing the beta of assets into the beta of collateralized assets. Doing this could bring more interesting findings about what are the sources of the collateral pledged, and how the valuation and volatility of the collateral affect the firm's investments.

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8. Appendix

8.1 List of independent variables

Gvkey

Firm identifier

Fyear

Fiscal year identifier

Size

Size of firm measured by total assets

Lsize

Size variable logged

Totdebt

Total debt, unsecured and secured debt

Ldebt

Totdebt variable logged

Capex

Capital expenditures

Tang

Tangibility, measure of property, plant and equipment standardized by total assets

Cashflow_at

Cashflow standardized by total assets

Cash_inv_pct

Cash holdings standardized by total assets

Mtb

Market value of assets standardized by book value of assets

Fs

Book value of equity standardized by equity plus total debt

Age

Time elapsed since the firm became public

Punsecbetaamr

Interaction term between punsec and betaamr

Ratingb_dummy

S&P rating for firms' debt

Dummy_coll

Dummy variable taking the value of 1 for firms pledging collateral of any type for financial debt, derivatives or letters of credit

Dummy_collfin

Dummy variable taking the value of 1 for firms pledging collateral in financial debt contracts

Dummy_collfintang

Dummy variable taking the value of 1 for firms pledging property, plant and equipment in financial debt

Dummy_collfinintang

Dummy variable taking the value of 1 for firms pledging patents or any sort of intangible assets in financial debt

Dummy_collfinrec

Dummy variable taking the value of 1 for firms pledging account receivables in financial debt

Dummy_collfininv

Dummy variable taking the value of 1 for firms pledging account inventories in financial debt

Dummy_collfincash

Dummy variable taking the value of 1 for firms pledging cash and marketable securities in financial debt

Beta

Equity beta of the firm, a measure of systematic risk

Betaamr

Asset beta of the firm, the volatility of a firm's available collateral

Const1 – Dividend Payout Ratio

Dummy variable taking the value of 1 for firms that are financially constrained. The payout ratio is defined as dividends plus stock repurchases to operating income. Firms that are financially constrained tend to have lower payout ratios than unconstrained firms (Fazzari et. al 1988).

Const2 – Size

Dummy variable taking the value of 1 for firms that are financially constrained. As smaller firms tend to be younger and less well known and therefore more endangered by capital market imperfections, they are more financially constrained.

Const3 – Long-term Debt S&P Rating

Dummy variable taking the value of 1 for firms that are financially constrained. Those firms have not had their public debt rated during the sample period.

Const4 – Kaplan&Zingales Index

Dummy variable taking the value of 1 for firms that are financially constrained. The index is constructed by Almeida, Campello and Weisbach (Almeida et. al 2004) based on findings in Kaplan and Zingales 1997.

Const5 – SA Index of Hadlock and Pierce

Dummy variable taking the value of 1 for firms that are financially constrained. Based on findings in Hadlock and Pierce 2010, firm size and age are good measures of financial constraint levels.

Const6 – Commercial Paper Rating

Dummy variable taking the value of 1 for firms that are financially constrained. Those firms have not had their issues rated during the sample period.

Cai_at

Collateral absorption index, valuation of collateral pledged standardized by total assets.

Wedge_coll

Wedge between collateral available and collateral pledged, serves as a measure of to which extent the firm has exhausted its available collateral.

Undercoll

Undercollateralization in secured debt, value of collateral standardized by the amount of secured debt outstanding.

Lmat

Log of maturity to facility

Lamount

Log of facility amount

Loantype

Type of financial instrument

Primarypurpose

Primary reason for taking on debt

Secondarypurpose

Secondary reason for taking on debt

Facilityamt

Amount borrowed by the firm

Maturity

When the loan matures

Secured

Whether the loan has collateral attached or not

Dummy_secured

Dummy variable taking the value of 1 if the loan has collateral attached

Revolving

Dummy variable taking the value of 1 if loan is revolving

Termloan

Dummy variable taking the value of 1 if the loan is a term loan

8.2 Summary of articles in the literature review

Authors and title	Focus	Approach	Data	Results
Aggregate Risk and the Choice between Cash and Lines of Credit. **(Acharya et al. 2013).**	The aggregated risk of a firm is a determinant for a firm to satisfy its future liquidity through cash reserves or credit.	Build on an existing model about the aggregated risk's impact on the liquidity policy of a company. Furthermore, the authors of this article add firm heterogeneity to distinguish the choices of cash reserves and credit.	The authors use data from LPC-DealScan and data provided by Amir Sufi, used in Sufi (2009).	If the company is exposed to high systematic risk, cash is best. Credit is better if the company only need to manage its own liquidity risk.
Collateral, loan quality, and bank risk. **(Berger and Udell 1989).**	The relationship between collateral and credit risk.	Their empirical analysis tests whether secured borrowers and loans are riskier than unsecured borrowers and loans.	The authors have used a sample consisting of 460 banks. The primary source is the Federal Reserve's Survey of Terms of Bank Lending.	Riskier firms tend to borrow secured and banks with many unsecured loans in their portfolio have risky portfolios.
Agency Costs, Net Worth, and Business Fluctuations **(Bernanke and Gertler 1989).**	The paper looks into how business cycles affect agency costs of real investment financing.	Applying shocks to the economy to see how borrower's net worth is affected.	The authors use a stochastic neoclassical growth model, allowing them to illustrate the impact of financial factors.	Agency costs of real investment financing are reduced when the borrower's net worth is high.
How does access to the unsecured debt market affect investment? **(Biguri 2015).**	How the investment is impacted by the debt structure, by investigating differences between unsecured and secured debt. Moreover, if one invest more with access to the unsecured debt markets.	The author has applied two sources of exogenous variation for identification. First, from the perspective of the company, by looking at a shock to the creditworthiness shown through a reduction in dividend taxes. The second considers the credit markets, where a paper market collapse	Biguri uses information on U.S. public firms from 2000 to 2010.	The overall result is that when a company has access to the unsecured debt markets, the larger is the investment. When they get restricted access, they start substituting with secured debt instead. Hence, collateral is

		results in a shortage of unsecured commercial paper. The two shocks is investigated by using a difference-in-difference approach. This includes an instrumental variable estimation. This give the author the opportunity to look at substitution patterns between types of debt and the impact on the investment.		not vital to investments.
The collateral channel: How real estate shocks affect corporate investment. **(Chaney et al. 2012).**	The investments sensitivity to changes in collateral value, shown through a real estate shock.	Computing the sensitivity of the investment by looking at the collateral value when exposed to local variations in real estate prices used as shocks.	The authors use accounting data on U.S. listed firms together with real estate prices.	If the value of the collateral appreciates, then this will lead to an increase in the investment which is financed by additional debt issuance.
When do laws and institutions affect the recovery rate of collateral. Working Paper. **(Degryse et al. 2014).**	Laws and institutions impact on the expected recovery rates on collateral.	Authors use a cross-country data set which is obtained from a large multinational bank.		Laws and institutions play an important role for the recovery rates on collateral, when the collateral is exposed to agency problems of the borrower. Also, that firms will benefit from higher expected recovery rates on the collateral, because their cost of finance will be reduced.

The economics of the private placement market. (**Federal Reserve 1993**)	Looks into how the privately placed debt relates to other debt markets.	Headlights two common misperceptions about privately placed debt.	Data are collected from public sources to the extent possible, but also from interview with market participants.	Information gathering is important when the borrower is smaller and less known, without access to the public bond market. The authors also found that there are differences in information-intensive lending. An important determinant of the debt market and of the borrowing terms, is the degree of the information problem that a borrower poses for lender
Credit Ratings, Collateral, and Loan Characteristics: Implications for Yield. (**John et al. 2003**).	How the bond yields are affected by the collateral.		The data contains all straight debt public issues at fixed rates in the period of 1993-1995. Model on why managers tend to use secured debt before unsecured assets. Then explaining the increase in yield of collateralized debt compared to uncollateralized debt.	After controlling for credit rating, the yield on collateralized debt will be higher than on general debt.
Credit Cycles. (**Kiyotaki and Moore 1997**).	During a business cycle, how the economic activity is impacted by credit constraints. Also, how shocks in	Results shown through a model where the lenders only can force repayment for secured debt, which implies that credit constraints come naturally.	The authors have constructed a model showing the relation between debt repayment and credit constraints.	Marginal shocks can impact output and asset prices.

	one sector can affect other sectors with related amplification effects.	As fixed assets are used as collateral, credit limitations affect the prices of these assets. This mechanism make implications for other sectors.		
Collateral Spread and Financial Development. **(Liberti and Atif 2010).**	Investigates the relation between financial development and the collateral cost of capital.	A general model that illustrate the connection between financial development and spread on collateral. To promote financial development, an institution will ease the borrowing constraints. This is done by lowering the collateral spreads and changing the collateral compositions.	The authors use data on small and medium business loans issued in 15 different countries.	It is easier to borrow in countries that are more financially developed. The collateral composition shifts toward firm specific assets.
The Cost of Capital, Corporation Finance and the Theory of Investment. **(Modigliani and Miller 1958).**	The cost of capital to a firm.	A partial-equilibrium approach where the focus is mainly on the firm and the industry.		The famous propositions I-III.
Capital Structure and Debt Structure. **(Rauh and Sufi 2010).**	The determinants of a company's capital structure.	Data consists of many rated public companies.		Focus on leverage ratios misses vital information about security issuance. Companies with low credit quality, have larger spread in priority structure.