Redefining Financial Constraints: a Text-Based Analysis

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ABSTRACT

We score text in firms' 10-Ks to obtain for each firm an annual measure of investment delays due to financial constraints and separate measures of each firm's marginal constraints due to concerns with equity and debt financing. Contrary to the focus in the literature, we find that the key constraints are the financing of R&D expenditures rather than capital expenditures, and that the main friction firms face is raising equity capital to fund growth opportunities. We also find debt-market constrained firms more closely resemble distressed firms funding CAPX. Our measures predict investment cuts following the financial crisis better than other indices of financial constraints used in the literature. Since constraints are most binding within the populations of small and young firms these results point to the challenges that the financial system faces in funding innovation.

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The investigation of the constraints on a firm's ability to raise capital for investment projects is a central question in the corporate finance literature. Researchers have identified numerous reasons why the market for external capital is subject to frictions that may impose perceived constraints. Imperfect and asymmetric information, moral hazard, cost of enforcement of contracts, and simple transaction costs for securities might create a wedge between the value of a project to a firm that has financial slack and a firm that relies on external financing. Yet, there exist a large number of institutions in the market whose function is to overcome these potential market failures. The net extent of financial constraints, their measurement and their effect on investment and operations is an active research area. In this paper we develop a novel methodology for identifying a firm's financial constraints based on its own disclosures and examine the effect of the constraints on the firm's production and financing activities.

Our approach begins with the firms' own disclosures in the Management's Discussion and Analysis (MD&A) sections of 10-K statements filed with the SEC by public firms. We analyze 41,037 10-Ks matched with Compustat from the period 1997-2009. The MD&A disclosures provide a source of information that relates to the firm's financial statements, but it also addresses various issues faced by the firm. Of the greatest relevance for us, the MD&A section contains mandated disclosures of expected material changes in the firm's liquidity, as well as discussion of changes in the firm's competitive position and demand for the firm's products over the year. Unlike financial data, these disclosures themselves point to the possible effects of financing constraints, identifying delays to investment objectives and obstacles in obtaining desired debt and equity financing. We analyze these statements for evidence of potential investment delays and associated difficulties in obtaining capital, and construct indices that measure those constraints. We benchmark these indices against commonly used measures of financial constraints and show the relations between our indices and firm characteristics. Finally, we explore the effect of the constraints we measure on the investment (capital investment and research and development expenditures) and financing activities (equity, private equity and debt issuance) of firms being subjected to product market and liquidity shocks.

We find that (MD&A) sections of 10-Ks are highly informative, and we score the text to obtain an index of investment delay due to financial constraints, and to obtain separate indices of equity and debt financing oriented constraints. We have several results to report.

First, we are able to obtain separate measures of investment delay due to liquidity factors and of liquidity concerns pertaining to equity-focused (and, separately, private-placement equity-focused firms) and debt-focused financing. Thus, in contrast to the current literature which identifies a single index of financial constraint or a single shadow-price of external finance, we can analyze whether the firm identifies the equity or debt constraint to be of most concern, and how that constraint is related to realized investment delays and security issuance delays.

The scores that we derive differ in several characteristics from existing indices of financial constraints due to Whited and Wu (WW) (2006) and Kaplan and Zingales (KZ) (1997). For example, firm size (defined using firm assets) explains 46% of the variation in the WW score and about 6% of the variation in KZ. By contrast, firm size alone explains only between 0.7-2.1% of our scores. Moreover, while our broad investment delay constraint and our equity-market constraint scores are inversely related to firm size, as are the WW and KZ measures, our debt-market constraint score is positively related to firm size reflecting the fact that larger firms have better access for debt financing. Unlike WW and KZ measures, which are positively related to firm age, our measures of constraints are negatively related to firm age. Moreover, our investment delay and equity measures are positively related to Tobin's Q, consistent with the notion that firms with growth opportunities are more likely to be the ones facing constraints on investment. On several other characteristics, our measures of investment delay constraints and equity-focused financing constraints load in the same direction as KZ and WW, whereas our debt-focused measure loads in the opposite direction. Taken together, these results suggest that our equity- and debt-focused measures are capturing very different types of constraints facing the firm'

We find that firms that score high on equity-focused constraints come from industries that have a high Tobin's Q, pay low dividends, have relatively high cash

holdings, low leverage and a relatively low operating income to sales ratio. These industries also have high capital expenditures and R&D expenditures relative to sales, and dynamic product markets. By contrast, financing constraints related to debt are associated with firms in industries with low Tobin's Q, high dividends, relatively low cash holdings, high leverage, and a high operating income to sales ratio. They also have low levels of capital expenditures and R&D expenses. We also find that firms with high delay investment scores tend to come from industries that also have similar characteristics to those with firms scoring high on equity-focused constraints.[1]

We also find that there are within industry differences between firms reporting equity-focused and debt-focused constraints. Relative to industry averages, firms reporting equity related constraints tend to have higher Tobin's Q, have higher leverage and lower operating income, lower investment and lower R&D to sales. By contrast, firms reporting debt constraints tend to have lower industry-adjusted Tobin's Qs, and dividends. They also report high industry-adjusted operating income, capital investment and R&D expenses. Again, we find that firms scoring high for reported investment delays exhibit more similarity to firms scoring high for equity-focused constraints than to firms scoring high for debt-focused constraints.

Finally, we examine the responsiveness of firms' R&D and capital expenditures, as well as equity and debt issues, to financial market and competitive shocks for different levels of financing constraints. We find that firms that have high delay investment scores decrease R&D and capital expenditures, as well as equity and debt issues, when subject to product market shocks, liquidity driven selling pressure on their stock, and the 2008 financial liquidity crisis.

We obtain different estimates of firms' responses to shocks depending on their scores for equity and debt focus. Firms that score highly on our equity focused delay index further reduce their R&D and capital expenditures, as well as equity issues. The relations are stronger for low CAPX focus firms than for high CAPX firms. They are also stronger for private-placement focused firms. By contrast firms that score highly on debt focus delay reduce their debt issuances, but report lower reductions in R&D, CAPX and equity issuances relative to firms that do not. Thus,

[1]These effects are robust to controlling for firm size and age.

a marginal debt-focus mitigates the effect of shocks on R&D and CAPX, in part because debt focused firms substitute equity financing for debt financing when shocks materialize. Firms that report equity focused constraints do not substitute debt for equity financing when subject to shocks.

The relative magnitude of a firm's equity- and debt-delay focus score predicts how the firms react to a negative shock. Firms with high Equity focus scores but low debt focused scores firms react to negative shocks by cutting investment but maintaining their issuance policy and by building up their cash balances. These firms substitute investment in cash, a liquid asset, for investment in intellectual or physical capital. By contrast, firms with debt focused scores and low equity focused scores balance their cuts in investment by reducing security issuances and do not increase their cash holdings.

The differences in how constrained and unconstrained firms respond to the two shocks we examine are economically large. For example, the highest tercile of delay constrained firms reduced their R&D by 11.3% of sales in the financial crisis of 2008, whereas the lowest tercile constrained firms reduced R&D by only 0.8% of sales. On the issuance side, the high delay constrained firms curtailed equity issuance by 2.5% of assets, and low delay constrained firms by only 1%. In standardized units, differential policy reactions by constrained versus unconstrained firms following shocks generally have magnitudes of roughly 10% to 20% of one cross sectional standard deviation.

We split our sample along several dimensions identified as relevant for predicting constraints in the literature. We find that the relations we identify are stronger for small firms than for large firms. Moreover, for small firms with high delay investment scores are associated with larger R&D curtailment, whereas for larger firms there is a stronger reduction in CAPX following negative shocks. Similarly, the effects of constraints are stronger for for firms with a high R&D focus, as measured by quantity of discussion of R&D activities in firm MD&A statements. Thus, the investment and financing of young, small, high R&D and low CAPX focused firms are the most sensitive to their level of reported constraints.

Taken together, these findings suggest that researchers need to consider equity and debt market financing constraints separately when estimating the shadow price of external capital in models of financial constraints. We find that the kind of constraints that are relevant depend on the firm's situation, and the type of investment that the firm undertakes. The findings of the strong effect of constraints on R&D is of particular interest since the focus in the literature is on the effect of constraints on CAPX. In particular, the financing constraint that appears most often binding for investment decisions is the constraint on being able to issue equity. Among investment classes, research and development strongly relates to equity market constraints. Capital expenditures more strongly relate to debt market constraints, although this CAPX effect is weaker.

Our work builds on the voluminous work on the existence of financing constraints. Myers and Majluf (1984), Greenwald, Stiglitz, and Weiss (1984), Jensen and Meckling (1976), Hart and Moore (1998) have all identified reasons for a wedge between internal and external financing. Jensen (1986) argues that there are conditions under which it is value enhancing for a firm to commit to reduce its ability to raise investment capital.

There have been several approaches to measuring financial constraints and their effects on firm investment. Fazzari, Hubbard and Petersen (1988) pioneered the study of cash flow shocks on investment of firms believed to be financially constrained. Whited (1992) and Whited and Wu (2006), among others, use dynamic models of investment to obtain the shadow price of external financing.

A second strand of research uses firms' own reports of financial constraints to measure their financial constraints and predict investment. Using surveys, Graham and Harvey (2001) and Campello, Graham and Harvey (2011) analyze the constraints of large firms and Beck, Demirguc-Kunt and Maksimovic (2006, 2008) analyze small firms. More closely related to our work is Kaplan and Zingales (1997), who use 10-Ks, including MD&As, from a sample of 49 firms to argue that manager disclosures provide accurate information about financial constraints. They find that this approach outperforms Fazzari, Hubbard and Petersen's (1988) classification of financially constrained firms. We discuss the work on constraints most directly related to

our work in greater detail in the next section.

Regarding the measurement of constraintedness, we conclude that (A) financial constraints are best measured using textual measures and (B) the sample of R&D focused, small and young firms is where the most relevant variation is between constrained and unconstrained (this is related to but differs quite materially from Hadlock and Pierce (2010) conclusion that size and age are the best proxies for constrained status). Our results also suggest that special consideration of equity, debt, and private placement focus add further clarity regarding the severity and impact of constraints. Finally, we find potentially severe R&D and CAPX funding issues for smaller and younger firms, and a tilt toward moderate issues in funding CAPX for larger and older firms.

Our use of text analysis follows Hanley and Hoberg (2010, 2011), who show that the analysis of firm disclosures at the time of initial filing for IPOs is informative and can explain much variation in IPO pricing. Our approach has several advantages. First, we obtain information on constraints for virtually all of the Compustat universe directly from firms' own disclosures. Our variables have the advantage of low ambiguity due to direct textual context, and we do not rely on ad-hoc specifications based on aggregations of accounting variables. Second, we avoid the difficulty of having to predict out of sample liquidity scores using endogenous variables as is required by methodologies that rely on indices derived from sampling firms. Third, we can query the text for additional data regarding important related questions, akin to using a survey (but not having to deal with issues of low response rates). For example, we can more readily identify whether a firm is expressing concerns about issuing equity or debt in connection with an investment delay, or whether constraints seem to materialize following competition shocks or low demand shocks. Fourth, the methodology we are using is transparent, consistent, and reproducible. We find a high degree of consistency in disclosure throughout our sample period. We believe that the methods used here can continue to be used in future years.

The rest of the paper is organized as follows. Section I discusses the prior literature, Section II describes our data and methods. Our results regarding constraint variable attributes are in Section III and our results regarding corporate finance

policies and constraints are in Section IV. Section V concludes.

I Literature and Hypotheses

The study of financial constraints is central to corporate finance. Some of the pioneering work is by Fazzari, Hubbard and Petersen (1988), who argue that holding investment opportunities constant, the capital expenditures of a financially unconstrained firm depend on the Net Present Value of the its investment opportunities. If financial constraints are not a first order control, investment should not be affected by contemporaneous cash flow realizations once the value of investment opportunities is controlled for. By contrast, a constrained firm's CAPEX would vary with its cash flows and be unaffected by cash flow shocks, again controlling for investment opportunities.

Fazzari, Hubbard and Petersen compare the size of the cash flow coefficient in a regression of CAPEX on Tobin's Q and the firm's cash flow to estimate the extent to which the firms in the sub-sample are constrained. They estimate this relation on various subsamples and find that the coefficient is larger in subsamples of firms believed ex-ante to be constrained. While influential in framing the debate on the role of constraints, the Fazzari, Hubbard and Petersen (1988) methodology has been criticized by Kaplan and Zingales (1997) on the grounds that the relation between the coefficient of the cash flow variable and the degree of constraints the firms face is not necessarily monotonic, but depends on the specifics of the functional forms of the firm's production and cost of external funds functions.

Kaplan and Zingales (1997) use management's statements from their financial disclosures to directly obtain a measure of financial constraints. First, for a sample of 49 firms classified by Fazzari, Hubbard and Petersen (1988) to be financially constrained, Kaplan and Zingales (1997) use expert evaluators to read annual 10-Ks, including the MD&A sections, over the period 1970-1984. The evaluators classify each firm in each year by the level of perceived financial constraints. They show that some of the firms classified by FHP as being financially constrained are not so constrained from the analysis of their 10-Ks. They also show that the CAPEX

of firms that are financially constrained using their classification is actually more responsive to cash flows than that of less financially constrained firms. More broadly, they use accounting variables to predict where a firm falls within their classification. This fitted model approach is often referred to as the "KZ index", and it uses the firm's cash flow, long-term debt, dividend-to-asset ratio and Tobin's Q to measure the level of the firm's financial constraints.[2]

A central issue with the general use of the KZ index to measure constraints is that it is estimated on a very small sample of firms for a specific period. Hadlock and Pierce (2007) extend the KZ approach to a random sample of 356 firms for the period 1995-2004. They read the management's letter to shareholders and the MD&A statements of those firms and score them on the basis of the number and quality of statements indicating financial constraints. They classify the firms on the basis of these statements into categories of constrainedness and attempt to reproduce the KZ index using this sample. Hadlock and Pierce find that the KZ index is unstable and does not do a good job at predicting constraintedness in their larger sample. They also find that the only variables that robustly predict financial constraints are firm size and age. This finding raises a more general concern that any attempt to relate a firm's constraints to the levels of essentially endogenous accounting variables will prove problematic and might be unstable.

A second approach, exemplified by Whited (1991) and Whited and Wu (1996), addresses some of these issues by explicitly modeling the relation between a firm's investment and the constraints it faces regarding the availability of external funds. The advantage of this approach is that it is possible to obtain explicit estimates of the shadow price of external capital for the individual firm. A potential limitation is that the estimates are grounded on restrictive assumptions about the objective function of the firm and the functional form of the shadow price of external finance. Whited and Wu adopt a specification in which the shadow price of external equity capital depends on the ratio of the long-term debt to total assets, an indicator that takes the value of one if the firm pays cash dividends, firm sales growth, firm size, the

[2]Lamont, Polk, and Saa-Requejo (2001) were the first to apply the KZ index to measure constraints out of sample.

firms three-digit industry sales growth, the ratio of liquid assets to total assets, the ratio of cash flow to total assets, and the three-digit industry debt to assets ratio. Estimates of these coefficients are then used to derive the WW index of financial constraints. Thus, the resulting index is weighted heavily towards being a measure of firm size and growth opportunities. In subsequent applications, the estimated coefficients obtained by Whited and Wu are often used out of sample as measures of constraints facing firms.[3]

Our approach is to use textual analysis to read the entire universe of MD&A sections from 10-K reports filed from 1997-2009 and use this data directly to derive indices of financial constraints. We then search the Capitalization and Liquidity of each MD&A for text indicating that a firm is delaying an investment project, and also separately, for text indicating that either debt or equity instruments are related to delay. Delays reported in the Capitalization and Liquidity subsection of MD&A are likely to be related to financing issues.[4] Separately, we search the entire MD&A for indications of whether the firm is experiencing a product market shock, such as an increase in competition. We directly assign a separate score for text indicating investment delays, equity-focused discussion of delay (also private placement focused discussion) and debt-focused discussion of delay for each firm for each year. We also score each MD&A for reports of product market shocks, and whether the firm is more focused on R&D or CAPX investments. Indices from these scores can then be applied directly in the analysis of corporate finance topics.

This approach has several distinct advantages. By reading the entire universe of MD&As we avoid the use of out of sample coefficients that have been obtained by reading text from a small sample of firms. The text itself is scored in a way that is reproducible. And by using text pertaining to financial constraints, we are using primary data, rather than data processed through a structural model which depends on assumptions about firm and market characteristics.

SEC Regulation S-K obligates firms to provide information in their 10-Ks on their liquidity, capital resources, and results of operations in their 10-K disclosures.

[3]It should be noted that Whited and Wu (1996) do not use estimates out of sample in this way.
[4]See below for examples and a discussion of this point.

For most firms these disclosures appear in a separate subsection within the MD&A section. In particular, in 80.1% of cases, the MD&A section groups the disclosures pertaining to financing in a separate Capitalization and Liquidity subsection.

The SEC requirements of most relevance are stated in Item 303 of Regulation S-K and are as follows:[5]

(1) Liquidity. Identify any known trends or any known demands, commitments, events, or uncertainties that will result in . . . the registrants liquidity increasing or decreasing in any material way. If a material deficiency is identified, indicate the course of action that the registrant has taken or proposes to take to remedy the deficiency. Also identify and separately describe internal and external sources of liquidity, and briefly discuss any material unused sources of liquid assets.

(2) Capital Resources. (i) Describe the registrants material commitments for capital expenditures as of the end of the latest fiscal period, and indicate the general purpose of such commitments and the anticipated source of funds needed to fulfill such commitments . . .

(ii) Describe any known material trends, favorable or unfavorable in the registrants capital resources. Indicate any expected material changes in the mix and the relative cost of such resources.

The term "liquidity" is clarified in Instruction 5: "The term "liquidity" as used in this Item refers to the ability of an enterprise to generate adequate amounts of cash to meet the enterprise's needs for cash...Liquidity generally shall be discussed on both a long-term and short-term basis."

The disclosures firms make in their MD&As can be viewed as a flow of information that parallels the disclosures they make in their financial statements. Although data from financial statements is used extensively, there is much less research about MD&A text disclosures. Accordingly, we initially posit a very simple model of MD&A disclosures regarding a firm's liquidity. Consider first a firm that has more available cash than required to invest in the projects that maximize its objective function $F(I) - I$, where $F(I)$ is the firm's net revenue function, which depends on the the

[5]See, for example, http://taft.law.uc.edu/CCL/regS-K/SK303.html for the full text of Item 303.

firm's investment level, I. Let I^* denote the optimal investment that solves the firm's optimizations problem.

If the firm does not have sufficient cash on hand to cover I^*. the funds must be obtained from external investors. In general, the cost of capital for external financing might differ from the opportunity cost of capital of the firm's internal cash. The differences may arise because of differential transactions costs, different tax treatments or various financial market imperfections. We refer to the difference between the cost of capital that the firm pays for outside financing and the firm's opportunity cost of its cash holdings as a financing wedge.[6] In most cases, the firm has a choice of financial instruments it might use to raise the required capital. In the simplest case, the choice will be between equity and debt. Let $w_E(I, \theta)$ and $w_D(I, \theta)$ be the financing wedges associated with debt and equity financing respectively, where θ is a measure describing the firm's growth options, competitive environment, financial market conditions, and all factors that affect its ability to raise capital.

The relative size of the financing wedge when the firm uses equity financing compared to debt financing will depend on firm characteristics, its access to financial markets and institutions, and market conditions. The firm will prefer the form of financing with the smallest wedge. In general the existence of a financing wedge will reduce the firm's desired investment below the optimal level I^*, to a constrained level I^C.

We hypothesize that if the quantity $I^* - I^C$ is not material, then the firm will not disclose this shortfall or extensively discuss the financing wedges that is faces. However, since firms face legal liability with respect to omissions and misleading disclosures under regulation S-K, if $I^* - I^C$ is material relative to the firm's size and operations, the firm will disclose a delay or postponement statement pertaining to this investment. In such cases, pursuant to Regulation S-K, the firm will comment on the nature of the wedge that may lead to the delay. We assume that if the financing wedge driving this reduced investment is smaller for equity (debt), that the firm's

[6]The cost of capital for outside financing may include implicit costs including increased risks of financial distress associated with increases in leverage.

discussion of issues associated with obtaining required financing will focus on equity (debt).

Below we score the Capitalization and Liquidity Section of every available MD&A for the period 1997-2009 for indications of delay $I^* - I^C$, and separately for discussion of equity and debt financing wedges, specifically text pertaining to shortfalls in equity and debt financing. This procedure gives us three indices of financial constraints, pertaining to investment and also debt and equity financing.

We then proceed to explore these indices and their relations to firm characteristics and to two forms of investment: Capital expenditures and R&D expenditures. We also separately search the MD&As for disclosures of material competitive, cost, and demand shocks that might affect the firms' liquidity position.

Our analysis focuses on several questions:

First, following shocks to θ, are changes in the levels of R&D and CAPX greater for for firms that report high expected investment delays $I^* - I^C$? Such a relation is implied by a well-behaved wedge function $w(I, \theta)$.[7]

Second, are changes in R&D and CAPX more likely to be associated with financing wedges involving equity or debt? The reporting requirements of our data set are particularly well-suited to the exploration of this question, which has not been addressed in the financial constraints literature. R&D expenditures are likely to be more financed using equity (Myers (1977)), and debt is more likely to be used to fund tangible investments such as CAPX. Thus, we would expect a higher sensitivity of R&D for those firms that are equity-focused on the margin, and greater sensitivity of CAPX for those firms that declare themselves to be debt-focused.

Third, we estimate the relationship between security issuance and financial constraints. Below we consider product market shocks, shocks to the liquidity of the firm's equity, and credit market shocks. We would expect that following a shock, constrained firms will experience a greater reduction in security issuance than unconstrained firms.

Fourth, we explore differential security issuance responses by firms that declare

[7] See, for example, Kaplan and Zingales 1997.

themselves at the margin to be either equity or debt-focused to shocks. We expect two effects. A firm that declares itself to be, say, equity focused at the margin should experience a greater reduction in equity issuance as a direct effect of a shock. However, there may also be a substitution effect, as a firm switches to a different, previously at the margin less desirable form of financing. This effect may be asymmetric. Thus, an equity financed firm with high R&D based growth options may find it very costly to increase debt issuance at the margin following a shock, whereas a firm financing CAPX with debt may find it less costly to substitute debt for equity.

Fifth, we also separate out firms that are constrained that also declare that they are focused on issuing private equity to fund their investments. As shown by Gomes and Phillips (2006), private equity issuers are more opaque than other firms, and private placements are costly ways of circumventing informational asymmetries in public markets. Thus, we expect these firms' investment and issuance policies to be particularly sensitive to shocks.

II Data and Methods

In this section we describe the data and the methodology we use to extract the 10-K text, and how we form the key text-based variables. The variables we create derive purely from 10-K text extracted from the "Management's Discussion and Analysis" (MD&A) section. The first step is to use web crawling and text parsing algorithms to construct a database of MD&A's from 10-K annual filings on the SEC Edgar website from 1997 to 2009. MD&A is legally required to be accurate, as indicated in Regulation S-K.

We utilize text processing software provided by meta Heuristica LLC to extract the MD&A section from each 10-K, and also to parse this section into subsections, with a particular focus on the Capitalization and Liquidity subsection (this section contains the firm's remarks concerning its financial liquidity and its intentions regarding capital market interactions). The software uses natural language processing to parse and organize textual data, and its pipeline employs "Chained Context Discovery". This approach leverages an empirical ontology to normalize the structure

of the content and to map concepts to a canonical form. The software then stores processed data in a high speed multi-dimensional database. From a research perspective, the technology enables fast and through querying, while permitting analysis that is also straight forward and easy to interpret. For example, many of the variables used in this study are constructed by simply identifying which firm-year filings (within a set of 40,000+ filings) specifically state that they may have to delay their investments, or that they are interested in issuing debt or equity going forward. The database supports advanced querying including contextual searches, proximity searching, multi-variant phrase queries, clustering, and other capabilities. These tools are designed to accelerate discovery of linguistic patterns that can further enrich content.

A The CRSP and COMPUSTAT Sample

We start with 56,496 firm-years in the COMPUSTAT sample from 1997 to 2009 that have adequate COMPUSTAT data, that are not in financial industries (SIC 6000 to 6999), and that have sales of at least $1 million and positive assets. The years are chosen based on the availability of our text-based data.

B The Sample of 10-Ks

Our sample of 10-K MD&A's is extracted using software provided by Metaheuristica Corporation. This software allows for the extraction of large volumes of text data based on simple queries, while providing many analytical tools to accelerate the process of data extraction. The data is based on a web search of the Edgar database for filings that appear as "10-K," "10-K405," "10-KSB," or "10-KSB40." MD&A generally appears as Item 7 in most 10-Ks. The document is processed for text information and a company identifier, CIK.

We merge each firm's text product description to the CRSP/COMPUSTAT database using the central index key (CIK), which is the primary key used by the SEC to identify the issuer.[8] Of the 56,496 observations available in CRSP and COMPU-

[8]We thank the Wharton Research Data Service (WRDS) for providing us with an expanded historical mapping of SEC CIK to COMPUSTAT gvkey, as the base CIK variable in COMPUSTAT

STAT database noted above, we are left with 52,249 after requiring that same-year text data is available. This loss of roughly 4,000 observations is due to two reasons: (1) the mapping from CIK to gvkey is incomplete and (2) some MD&As are not filed in the 10-K itself, but are incorporated by reference (a future version will incorporate these additional MD&A's). Of the 52,249 observations with identifiable, machine readable MD&A sections, 41,686 of these also have identifiable machine readable Capitalization and Liquidity Subsections (the key subsection used to identify Financial Constraints). We later show that the firms that have a valid MD&A, but not a distinct Capitalization and Liquidity Subsection, are generally healthy firms that have few if any liquidity issues to disclose.

C Using Text to Identify Financial Constraints

This study focuses on understanding the language used in the Management's Discussion and Analysis (MD&A) Section of the 10-K in order to measure whether a firm is financially constrained, and also to understand how a firm's constrained status changes over time. After reading many of these filings, we found that the majority discuss their capital liquidity in a key subsection of the MD&A that focuses on capitalization and liquidity. This approach follows that used by Kaplan and Zingales (1997), who also focus on the firm's stated liquidity, but in a much smaller sample.

We begin by identifying the set of firms that discuss the possibility of delaying investment in this subsection. Because this subsection explains the firm's liquidity and the implications of its liquidity, it follows by context that firms discussing delayed investment in this section are indicating that it is their ability to obtain financing that is the key reason why they might delay investment. Indeed some firms often state explicitly that poor financing options are to blame.

Because there are many ways to indicate delay, and even more forms of investment, identifying a reliable set of firms that are considering delayed investment using text offers many challenges. Upon running multiple queries using the set of synonyms to the word delay, and recording which forms of investment often appear in the text

only contains the most recent link.

surrounding this word, we were able to construct a key-word-pairings search resulting in a well-identified set of firms that are indeed reporting potential delays in investment. We begin with a precise training set, in which we require that one word from each of the following two lists exist side by side (separated by no more than one stop word such as "the", "of", "and", etc). Note that "*" denotes a wildcard.

Delay List 1: delay* OR abandon OR eliminate OR curtail OR (scale back) OR postpone*

Delay List 2: construction OR expansion OR acquisition* OR restructuring OR project* OR research OR development OR exploration OR product* OR expenditure* OR manufactur* OR entry OR rennovat* OR growth OR activities OR (capital improvement*) OR (capital spend*) OR (capital proj*) OR (commercial release) OR (business plan) OR (transmitter deployment) OR (opening restaurants)

We find that 1.6% of all firm-year observations load on this query and indeed have one word from each list existing in their Capitalization and Liquidity subsection (henceforth CAPLIQ). We refer to these firms as the "precise delay investment" training set. However, in reading many of these subsections, we also note that a large number of firms exist that have words from both lists present, but not necessarily side by side. This is a natural consequence of the issue of delaying investment being a rather intricate issue to express verbally. Some writers add more detail, whereas others are more Spartan.

As our objective is to identify as many firms as possible who indicate delay of investment, we thus consider a query that relaxes the requirement that both words from both lists must exist side by side in the text. Instead, we require that both words appear within a twelve word window of one another. Indeed this identifies a much larger set of firms, as 5.4% of all firms satisfy this twelve-word enhanced query. We refer to this set of firms as the "12-word delay investment" training set.

We also identify which firms are focused on issuing equity or debt. In reading many filings, we identified a number of commonly used phrases that identify an

equity focus. These are as follows:

Equity Focused List: issuing equity securities OR expects equity securities OR through equity financing OR sources equity financing OR seek equity investments OR seek equity financings OR access equity markets OR raised equity arrangements OR undertake equity offerings OR sell common stock OR issuing common stock OR selling common stock OR use equity offerings OR offering equity securities OR planned equity offering OR seek equity offering OR raise equity offering OR equity offering would add OR additional equity offering OR considering equity offering OR seek equity financing OR pursue equity offering OR consummates equity offering OR raises equity capital OR raise equity offering OR sources equity offering.

Regarding debt focused firms, we consider the following commonly used phrases.

Debt Focused List: increased borrowings OR use line of credit OR expanded borrowings OR funded by borrowings OR additional credit lines OR incur additional indebtedness OR pursue lines of credit OR anticipates lines of credit OR through loan financing OR borrowings bond issue OR increase line of credit OR provided by credit facilities OR seek borrowing transaction OR raise borrowings OR additional bank financing OR raises debt capital OR secure line of credit OR borrowing of capital

As before, we consider a precise query identifying firms that use these phrases as listed above, and an expanded query allowing these phrases to be expressed in a twelve word window. For the precise query, we find that 1.0% and 3.4% of all firms are equity and debt focused, respectively. We refer to these two groups of firms as the "precise equity focus" training set and the "precise debt focus" training set, respectively. When we relax the requirement that the words in each phrase must appear side by side, and allow the words in each phrase to appear within a twelve word window, we then find 12.6% and 14.6% of all firms are equity and debt focused, respectively. We refer to these two groups of firms as the "12-word equity focus" training set and the "12-word debt focus" training set, respectively.

Finally, we also identify which firms are focused on issuing private placements of equity. We identified mentions of private placements by requiring that one word

from each of the following three lists be used within a 12 word window:

Private Placement List 1: private

Private Placement List 2: placement OR placements OR sale OR sales OR offering OR offerings OR infusion OR infusions OR issued OR issuance OR financing OR financings OR funding

Private Placement List 3: equity OR stock

We find that 9.0% of the firms in our sample that have a CAP+LIQ subsection mention private placements using this query.

D Degrees of Financial Constraints and Scores

The methodology in the above section identifies a "training set", or a set of 10-Ks within the set of all 10-Ks (the "corpus") that specifically indicate the possibility of delayed investment. Because this concept likely results only when many factors all point to difficulties with the financial markets, we hypothesize that many other firms in our sample are likely partially constrained, or close to being constrained. Therefore, much information might be lost if we rely on the training sets alone in isolation. We thus consider the entire text in the CAP+LIQ section to score all firms in our 10-K corpus. For example, methodology used in Hanley and Hoberg (2010) can be used to score each CAP+LIQ section based on how similar it is to those in the training set, while controlling for the presence of standard (boilerplate) text. The results would be a score assigned to each firm, which is a continuous variable, and firms with higher scores are more likely to be constrained, or are closer to being fully constrained. Firms with lower scores are either unconstrained or only partially constrained.

Where N denotes the number of unique words in the entire corpus, we define an N-vector for each firm i in each year t as $word_{i,t}$. This vector is populated with the number of times each word corresponding to each of the N elements is used in firm

i's CAP+LIQ subsection in year t. We next define the normalized vector for each firm year $norm_{i,t}$ as being equal to $word_{i,t}$ divided by the sum of its components. This is the vector we seek to "explain" using various text factors related to boiler plate content, delay investment content, equity focus content, debt focus content, and private placement focus content.

We define standard (boilerplate) content in year t $stan_t$ as the average $norm_{i,t}$ over all firms in the corpus in the given year. We define the delay investment text vector in year t using a two step procedure. First we compute the average word usage vector using all words in all paragraphs for paragraphs that are members of the "12-word delay investment" training set discussed in the previous section. Second, we regress this vector on the standard content vector $stan_t$ and take the residual. This residual vector, which we label $delay_t$ approximates the non-standard (or non-boilerplate) content in these paragraphs where firms are mentioning their intent to possibly delay investment, and the factors contributing to this possibility. The main idea is that any firm that has content that is highly similar to this content is likely more constrained than a firm whose text is not similar to this content. In particular, the former firm would be expressing some of the key factors that ultimately lead firms to actually report financial constraints.

We compute equity focus content using a similar procedure. However, we first note that our objective is not just to identify firms that are focused on potentially issuing equity, but more precisely those that are both constrained and focused on issuing equity. This allows us to explore whether there is a difference between firms that might be equity constrained or debt constrained. Therefore our first step is to compute the average word usage vector using all words in all paragraphs for paragraphs that are members of both the "12-word delay investment" training set, and the "12-word equity focus" training set, but not members of the "12-word debt focus" training set (all training sets are discussed in the previous section). Second, we regress this word usage vector on both the standard content vector $stan_t$ and the delay investment vector $delay_t$ and take the residual. This residual vector, which we label $equityfocus_t$ approximates the non-standard (or non-boilerplate) content in these paragraphs that is unique to firms that are both indicating the need to delay

investment, while also mentioning the potential desire to issue equity, but not the desire to issue debt. The main idea is that any firm that has content that is highly similar to this content is likely constrained, but is focused on issuing equity rather than debt as the potential solution should liquidity improve. We define our debt focus variable $debtfocus_t$ in a fully symmetric fashion.

With this rich set of word usage vectors, all of length N, we are able to decompose a given firm's CAP+LIQ section into components that load on each factor. We thus run the following decomposition regression for each firm in each year:

$$norm_{i,t} = c_{stan,i,t}\ stan_t + c_{delay,i,t}\ delay_t + c_{equity,i,t}\ equityfocus_t + \tag{1}$$

$$c_{debt,i,t}\ debtfocus_t + \epsilon_{i,t}$$

The coefficients from this regression are the "degree of constraint" scores for firm i in year t. We therefore define the "Delay Investment Score" as the coefficient $c_{delay,i,t}$, "Equity Focused Score" as the coefficient $c_{equity,i,t}$, and "Debt Focused Score" as the coefficient $c_{debt,i,t}$. These variables respectively measure the degree to which a firm faces financial constraints (broadly), faces constraints but has an equity focus, and faces constraints but has a debt focus, respectively.

Figure 1 displays the empirical distribution of our text-based constraint scores. The figure shows that these variables generally have a bell shaped distribution without extreme outliers. The distributions also have two additional features. First, all three variables have a spike above the bell curve at zero. This occurs because roughly 4% of all firms that have a CAPLIQ section that is very small. In these cases, the loading on the constrained training set can be zero if none of the words in the small CAPLIQ section coincide with those in the constrained training sets. Due to the existence of this small spike, we examine robustness to including a dummy variable for firms with scores of exactly zero, and our results are close to unchanged. We also consider a test in which we reclassify firms that have a very small CAPLIQ section as not having a CAPLIQ section for the purposes of our study (results are also close to unchanged). Hence we use the constraint variables as defined above for parsimony. The second feature of the distributions is that all three are slightly right skew. This is primarily due to the fact that firms that are members of each training set tend to

have higher scores than firms that are not in the training set. We view this behavior to be appropriate and consistent with the proper scoring of firms.

We also compute a "Private Placement Focused Score", where the objective is to identify the focus on selling equity to private investors, holding fixed the degree of unconditional delay constraints, and holding fixed the focus on selling equity or debt unconditionally. Our first step is to compute the average word usage vector using all words from all firms that are members of both the "12-word delay investment" training set, and the "12-word private placement focus" training set. Second, we regress this word usage vector on the standard content vector $stan_t$, the delay investment vector $delay_t$, the equity focus vector $equityfocus_t$, the debt focus vector $debtfocus_t$, and take the residual. This residual vector, which we label $privatefocus_t$ approximates the non-standard (or non-boilerplate) content in these paragraphs that is unique to firms that are both indicating the need to delay investment, while also mentioning the potential desire to issue a private placement, holding fixed the desire to issue equity or debt. This private placement variable is then added to the model in equation 1, and the resulting coefficient on $privatefocus_t$ is the given firm's degree of focus on private placements.

We also compute a "Covenants Violation" score variable using a similar two step procedure. First we identify a training set based on firms that mention the words covenant and violation within a 12-word window. We then compute the average word usage of paragraphs that match on this query in each year and thus define the N-vector $covenant_t$. Next we run the following decomposition regression (which controls for standard content as before):

$$norm_{i,t} = c_{stan,i,t}\ stan_t + c_{covenant,i,t}\ covenant_t + \epsilon_{i,t} \tag{2}$$

We therefore define "Covenant Violation Score" as the coefficient $c_{covenant,i,t}$, and this variable measures how close firms are to satisfying the liquidity conditions generally necessary to trigger covenant violations.

E Investment Opportunity Measures

A key challenge in our framework is that a firm must have an investment opportunity before it can possibly report potentially having to delay the investment. As a result, it is natural to ask whether delay of investment text is primarily capturing firms with high levels of investment opportunities, or firms that are genuinely financially constrained? This section addresses this issue by constructing measures if investment opportunities based on vocabularies associated with three classes of investment opportunities. In later analysis, these variables will enable us to examine financial constraints holding fixed each firm's investment opportunities.

Our approach is analogous to the stepwise regression method used in equation 1, except that we focus on R&D, Capital expenditures, and acquisitions. We first identify the following text queries:

R&D Focused List: research OR development OR new product OR new products.

CAPX Focused List: construction OR expenditure OR rennovation OR capital improvement OR capital spending OR capital project OR opening restaurants.

Each query was identified by reading a number of randomly selected MD&A sections to identify common vocabularies used by firms discussing each kind of investment. Unlike our earlier analysis, which were limited to the Capitalization and Liquidity subsection, discussion of investment opportunities is generally in the MD&A but generally not in the Cap+Liq subsection. Hence we use the entire MD&A to identify which firms are most focused on various investments, and we do not rely on the Cap+Liq section alone as we did in earlier variable constructions.

We compute the fraction of paragraphs in each firm's MD&A that score on each query above. This generates two measures of investment focus that are a function of the entire MD&A: MD&A R&D Focused Score, and MD&A CAPX Focused Score. Each variable is bounded in the interval [0,1].

F Measuring Shocks

We also use the text in the Management's Discussion and Analysis (MD&A) to identify firms that might be facing shocks. Unlike in the previous section, where we focus on just the CAP+LIQ subsection, we explore the entire MD&A in this section, as we find that firms might mention potential shocks in various locations of this section when explaining fiscal year results. We consider competitive, demand, and cost shocks. In each case, we identify shocks by requiring that two words from two separate lists exist side by side in the text of a given firms' MD&A in a given year. These variables are relevant to exploring which firms might move from an unconstrained status to a constrained status in time series.

Our first variable is the "Higher Competition Dummy". This variable is set to one when a firm-year MD&A has the word increasing or one of its synonyms (increasing OR increased OR higher OR greater OR intensified OR intensification) appearing beside the word competition or one of its synonyms (not necessarily in the Capitalization+Liquidity Subsection) in its MD&A in the given year.

We next define the "Increasing Cost Dummy". This variable is set to one when a firm-year MD&A has the word increasing or one of its synonyms (increasing OR increased OR higher OR greater OR intensified OR intensification) appearing beside the word cost in its MD&A in the given year.

We next define the "Lower Demand Dummy". This variable is set to one when a firm-year MD&A has the word lower or one of its synonyms (decreasing OR decreased OR lower OR reduced OR reduction) appearing beside the word demand in its MD&A in the given year.

Beyond using text data, we also explore the impact of the 2008 the financial crisis on constrained versus unconstrained firms. We also explore the role of forced mutual fund selling as in Edmans, Goldstein and Jiang (2011).[9] This measure is based on mutual fund redemptions, can be seen as an exogenous source of variation in a firm's liquidity that is not attributable to firm policies.

[9]We thank Alex Edmans for providing this data on his website. Analogous to our usage, Phillips and Zhadanov (2011) use this variable as an instrument for a firm's equity valuation that is unrelated to fundamentals.

G Control Variables and Financial Ratios

Throughout our analysis, we present results for financial ratios that are based on COMPUSTAT variables (including R+D/sales, CAPX/sales, operating income/sales, etc). In all cases, we winsorize financial variables that are defined as ratios at the 1/99% level in each year to reduce the impact of outliers. We also include controls for firm age and log assets in many specifications.

III Financial Constraints

In this section, we first examine the properties of our financial constraint measures both in time series and in cross section. We also compare our measures to existing measures used in the literature.

A Summary Statistics and Correlations

Table I displays summary statistics for our 1997 to 2009 panel of 52,249 firm-year observations having machine readable MD&A sections in their 10-K, as filed in the SEC's Edgar database. In Panel A we find that 79.9% of these firms have a machine readable, separable, Capitalization and Liquidity subsection (CAPLIQ). We also find that 8.2% of all paragraphs in MD&A mention R&D terminology, but only 1.9% mention capital expenditures terminology. Because we require a CAPLIQ section to compute most of our key variables, we conduct our empirical analysis in two stages: (1) we examine which firms have a distinct CAPLIQ section and why, and (2) among those that do, we explore our key hypotheses relating to financial constraints. In later sections, our results will suggest that the firms that do not include a CAPLIQ section are primarily unconstrained firms. These firms likely omit CAPLIQ because they have no material liquidity challenges to report and such firms find it convenient to only briefly discuss their liquidity within MD&A without a proper subsection. Because firms omitting CAPLIQ are likely unconstrained, the fact that much of our focus is on firms that do have CAPLIQ is unlikely to be problematic because the primary challenge in the literature is to identify constrained firms (not unconstrained

firms).

[Insert Table I Here]

Panel B reports summary statistics regarding the membership of our strict training sets, and Panel C reports summary statistics regarding the members of our 12-word expanded training sets. Not surprisingly, expanding the text queries to 12 words greatly improves coverage. Firms reporting delayed investment increase from just 1.6% to 5.3%, and firms reporting an equity or debt focus increase from 1.0% to 3.4% to 12.7% to 14.7%. The larger memberships give us more power to test our key hypotheses, and not surprisingly, our results are stronger for tests based on the expanded 12-word training sets.

Panel D reports summary statistics for our score-based constraint varaibles, and Panel E reports summary statistics related to covenant violation scores and the size of the CAPLIQ section. Because the construction of these variables controls for standard (likely boiler plate content), intuitively, these scores are relative rankings and have means near zero. These variables measure the degree to which the given firm's CAPLIQ section is similar to that of firms in each respective training set. Hence, the delay investment score, for example, measures the proximity a given firm is to firms that are known to be reporting potential investment delays. As the notion of financial constraints is unlikely to be all or none, we believe this approach provides a measure of the degree to which a firm is constrained.

Panel F reports the summary statistics for our shock variables. All four shock variables have averages that are less than 15%. This matches the intuition that more severe shocks only affect a minority of firms at any one given time. Panel G reports summary statistics for the four corporate finance policies we examine later in this article. These results suggest that firms in our sample spend an average of 16.6% of their sales on R&D and 10.7% of their sales on CAPX. Equity and debt issuance average 4.9% and 10.2% of assets, respectively.

Table II reports Pearson correlation coefficients between our financial constraint variables, and other financial constraint variables used in the literature including the KZ index and the WW index. We also include the covenant violation text score

variable. We do not report significance levels on this table as all correlations are significant as one should expect in this kind of comparison. We instead focus our discussion on economic significance.

[Insert Table II Here]

Table II shows that our three constraint variables are only slightly correlated. This result is influenced by our construction based on orthogonalized text vectors, as our intent is to (1) identify the degree of investment delay constraints, and then (2) to identify the degree of debt and equity focus among constrained firms, while holding fixed standard vocabulary. Our delay investment variable is just -0.9% correlated with our equity market constraint variable, and 4.6% correlated with our debt market constraint variable. The debt and equity constraint variables intuitively are more modestly negatively correlated at -9.1%. This correlation is likely due to the fact that a purely equity focused firm is not a debt focused firm and some firms might consider both forms of capital to be relevant on the margin.

In comparing our constraint variables to existing measures, we find (not surprisingly) that our delay investment constraint is positively correlated with both the KZ index (4.3%) and the WW index (7.1%). However, readers may find it surprising that these correlations are rather low. The fact that they are low indicates that each of these variables contains much distinct information. Our later analysis suggests that the KZ index and the WW index primarily load on investment opportunities, firm size, and firm age.

Because firms must have viable investment opportunities before they might be forced to delay them, our three text-based constraint variables also correlate substantially with investment opportunities. Firms that are delay investment constrained tend to be more focused on R&D than CAPX, likely because the former investment type is more prone to informational asymmetry. Equity focused constrained firms load even more on R&D relative to CAPX, whereas debt focused firms load more on CAPX. The results for debt focused constrained firms, intuitively, are consistent with asset tangibility and reduced uncertainty.

The table also shows that the KZ index and the WW index correlate in an op-

posite way with our equity and debt market constraint variables. The WW index correlates more with equity-focused constrained firms, and the KZ index correlates more with debt-focused constrained firms. Also relevant, our debt market constraint variable correlates positively with firms reporting covenant violations (54.6%). This suggests that these firms (not surprisingly) experience some distress. However, our other two constraint variables (delay score and equity focused delay) are slightly negatively correlated with covenant violations text, indicating that they contain information potentially linked to market frictions and not distress.

B Time Series and the Financial Crisis

Although not reported to conserve space, we note that our financial constraint variables are somewhat persistent, but not overwhelmingly so. Our three key textual constraint variables have autocorrelation coefficients that range from 0.4 to 0.6. Hence, a firm that is constrained in a given year is quite likely to be constrained next year, but unlikely to still be constrained two to three years later.

Table III reports the time series averages of our constraint and shock variables over our sample. Although our results suggest there is a link between financial constraints and business cycles, we interpret these results with caution as our sample covers just thirteen years. We display results for all firms (Panel A), large firms (Panel B), and small firms (Panel C).

[Insert Table III Here]

Panel A of Table III shows that our constraint variables experience meaningful time series variation, and that the financial crisis of 2008-2009 had a significant influence on reports of investment delay constraints. Both the precise delay dummy and the 12-word window delay dummy jump sharply from 2007 and reach an all-time high in 2008. This increase is statistically significant at the 1% level for the 12-word window despite the short nature of our sample. Although both debt and equity focused delay constraints also increase in columns three to six in Panel A, the increase is only significant for equity focused delay. This provides evidence that many constrained firms sought equity financing around the time of the crisis, but

they did not have confidence they would obtain it.

Comparing large firms (Panel B) to small firms (Panel C) reveals that the financial crisis did not affect all firms equally. Although both groups have significant increases in delay investment constraints during the crisis, small firms have significant increases in equity focused delays but not debt-focused delays. Larger firms have the opposite result. This contrast is stark in statistical and economic terms. For example, small firms actually experienced a slight decline in debt focused delays (12-word window) during the same time that the equity focused delays increased substantially to more than double the 2006 levels. These results suggest that although both large and small firms became more constrained, smaller firms became more focused on raising equity to solve their liquidity issues whereas larger firms focused more on raising debt. In both cases, these firms did not have confidence in their ability to successfully raise capital. We conclude that financial constraints matter, and the financial crisis had differential effects for large and small firms.

The table also shows that the investment focus variables changed little during our sample period, and that the shock variables also had little or only moderate aggregate variation. This is not surprising if shocks are mainly localized within product markets (as one might expect to be the case for competition, cost, and to some extent demand shocks). Although significance levels are just below standard levels, we do find some evidence that our low demand shock variable increases during times of relative economic distress. For example, this variable was relatively low during the 1990s, but increased in 2001 and 2002 following the events of 9/11 and the technology bust. This variable jumps again in 2008. Hence, low demand might be linked to some of the problems faced by firms in the financial crisis.

C Firm Characteristics and Constraints

We begin our analysis by assessing which firms file a full Capitalization and Liquidity subsection in their MD&A in a given year. Our summary statistics indicate that 80.1% of firms do file a full CAPLIQ subsection, and we conjecture that only unconstrained firms might opt not to disclose this content. Our conjecture is based on

the fact that disclosure of liquidity is required by law, and only unconstrained firms might have sufficiently little to disclose to warrant not including this subsection. Consistent with this view, we find that firms that omit formal CAPLIQ subsections generally mention liquidity briefly in their overall MD&A.

Table IV formally tests this conjecture by examining which firm characteristics correlate with the existence of a full CAPLIQ subsection using a logistic regression in which the dependent variable is a dummy equal to one when the firm has a CAPLIQ subsection. We include industry and year fixed effects (Panel A), or firm and year fixed effects (Panel B), and all standard errors are adjusted for clustering at the firm level.

[Insert Table IV Here]

Table IV shows that firms not disclosing a full CAPLIQ subsection indeed are likely to be more constrained. These firms have fewer assets in place and are younger. Evidence in Hadlock and Pierce (2007) relating constraints to size and age supports this interpretation. Firms having a CAPLIQ section are also less likely to pay dividends, tend to be more R&D oriented, and tend to have higher leverage. The focus on R&D rather than CAPX by these firms, supports a possible link between liquidity challenges and uncertainty or the sensitivity of investment to asymmetric information. Because firms not reporting a full CAPLIQ section are unlikely to be constrained, henceforth, we focus only on the sample of firms that has a machine readable CAPLIQ subsection.

In Table V, we run similar panel data regressions as in Table IV (discussed above), except that our sample is reduced to only include firms with a CAPLIQ section, and our set of independent variables is changed and we now focus on our three primary constraint variables (delay investment constrained, equity-market constrained, debt-market constrained, and private placement constrained) plus a control for the size of the CAPLIQ section, and a control for firm size (measured using log assets).

[Insert Table V Here]

The results of Table V are highly consistent with our delay investment constraint

variable indeed being a valid measure of financial constraints. We highlight three major pieces of evidence, but also note other nuances. First, the table shows that firms with high delay investment scores tend to operate in industries with very high Q. This is consistent with these firms likely having a wide array of investment opportunities to choose from, a necessary requirement for binding financial constraints as a firm must have promising investment opportunities in existence before it can delay them. This result also confirms that financial constraints and distress are entirely distinct concepts, as distressed firms intuitively have low Q. Second, we find that the delay investment score is negatively correlated with dividend payouts. Intuitively, constrained firms will choose to invest or save cash, rather than pay dividends.

The third major finding regarding the delay investment variable is that it is uniformly positively related to both forms of industry investment, including capital expenditures and research and development. This is supportive of the necessary condition for a financial constraint to be binding, as the firm must have promising investment opportunities before it can delay them. Moreover, the delay investment variable is uniformly negatively related to own-firm investment using both forms of investment. This supports the direct prediction of financial constraints: the firm has lower investment than it might like to have (so the constrained firm in an industry invests less than its industry peers on average). Finally, we note the strong statistical significance of these associations. In all cases, standard errors are adjusted for clustering at the firm level.

The results of Table V strongly support the conclusion that equity market and debt market constraints are different, and that firm characteristics are important drivers of which firms face constraints in the debt market, the equity market, or both. Most supportive of this conclusion is that the majority of coefficients for the equity-market constraint variable and the debt market constraint variable have opposite signs that are individually significant. This is quite remarkable given that these variables are mutually little correlated as discussed earlier. Hence, their mirror image results are most likely due to economic forces and genuine links to firm characteristics. Broadly speaking, equity market constrained firms have a similar profile as do delay investment constrained firms. These firms have high Q and little in the way of current

profits, and hence they are more growth oriented. Regarding investment policy, they also reside in product markets with high levels of R&D, although they have lower than average R&D, consistent with constraints being especially binding regarding this category of investment. These firms also reside in product markets where firms tend to hold high levels of cash. We interpret these findings to be consistent with preserving real option value. Firms with high levels of growth options need to ensure survival to maintain the value of their growth options, and equity is the safest form of capital given these challenges.

The results for the private placement score are similar overall to those for the equity focused score. Intuitively, private placement focused firms are essentially more extreme versions of equity focused firms. Firms that score highly on both variables are likely to be among the most constrained firms, a result we find support for in our policy regressions in the next section.

In contrast, firms that are debt market constrained are in product markets with low Q, and these firms have even lower Q relative to their industry peers. These firms also hold less cash. In all, these firms, unlike equity market constrained firms, have some resemblance to distressed firms and fallen angels. However, one striking characteristic they have is that their investment levels are above their industry averages. Like distressed firms, these debt constrained firms are in industries with few investment opportunities. However, the fact that debt constrained firms have R&D levels that are above industry average levels suggests that these firms might have better than average investment opportunities relative to their distressed peers. The existence of viable investment projects indeed appears to be a necessary condition for being financially constrained, for both debt and equity constrained firms. In all, our findings motivate the need for theoretical models to consider financial constraints in a richer setting with multiple sources of capital being available.

Finally, Table V also suggests that the size of the CAPLIQ subsection is somewhat informative as well, although this variable's footprint in the data is more modest. We include this variable to address any concerns that our text variables are just loading on the size of the CAPLIQ document itself. We attribute the findings for the size of CAPLIQ variable, which loads negatively on dividend policy, as being consistent

with the size of the CAPLIQ also being a weak proxy for financial constraints or distress. Firms that need to disclose more in this section are likely face especially complex interactions with the financial markets.

In all, our results strongly support the conclusion that our delay investment variable is measuring the degree to which firms are constrained, and our equity and debt market constraint variables affirm that both forms of capital play unique roles in how financial constraints affect firm policies.

IV Investment Policy and Financial Constraints

In this section, we examine whether firms with higher levels of financial constraints react to negative shocks differently than do unconstrained firms. We examine two types of investment expenditures – CAPX and R&D expenditures – and two forms of external financing — equity and debt financing. While historically the literature on constraints has focused on examining financing of CAPX expenditures, the financing of R&D is more likely to be subject to the constraints, both because R&D is less tangible and less certain, and because R&D focused firms are often small and young and lack a well established track record or other pledgeable assets.[10] We consider both equity and debt financing because they have different sensitivity to informational asymmetries (Myers and Majluf (1984)) and the tangibility of the underlying investments.

We consider two shock variables as independent variables in the policy regressions. The first is the aggregate sum of the three text-based shock variables (high competition, low demand, and high cost). Our second shock variable is a 2008-2009 financial crisis dummy.

We consider three shock variables as independent variables in the policy regressions. We use the first two variables to examine whether constrained firms react differently to material negative shocks. Our first shock variable is the aggregate sum of the three text-based shock variables (high competition, low demand, and high

[10]Brown, Fazzari and Petersen (2009) discuss the factors that make financing of R&D expenditures more susceptible to constraints.

cost). Our second shock variable is a 2008-2009 financial crisis dummy. Although the text-based shock is a micro-economic shock, our use of these shocks parallels the framework Opler and Titman (1994), who examine the effect of a macro-economic shock on financially distressed firms. Our third shock variable is useful in examining whether constrained firms react differently to an exogenous equity market liquidity shock, the forced selling in response to redemptions of their securities by mutual funds, as in Edmans, Goldstein and Jiang (2011). For ease of comparison, we scale all shock variables to be more positive when the shock arrives (mutual fund selling is scaled to be negative in Edmans, Goldstein and Jiang (2011)).

A central hypothesis in the literature is that constrained firms should scale back issuance and investment activities more following negative shocks, as their constraints likely become more binding in times of hardship. As a first cut, in Table VI we show the economic magnitudes of interactions between policy variables and constraint variables during each of the two shocks we considered. For each shock, we consider the difference in each policy for treated firms minus the policy level for non-treated firms. For the financial crisis, the treated value is the firm's value of the policy in 2009, and the untreated value is the firm's value of the given policy in 2007. For the text shock, the treated value is the average policy for firms experiencing at least one of the three text shocks (low demand, high competition, or high cost) and the untreated value is the average policy for firms experiencing none of the three text shocks. For forced mutual fund selling, the treated value is the average policy for firms with above median forced selling and the untreated value is the average policy for firms that have below median mutual fund selling. Because each of the policy variables is scaled by sales or assets, the reported mean changes are in fractional units of sales or assets, respectively.

[Insert Table VI Here]

The table suggests that differences regarding how constrained and unconstrained firms differentially react to shocks are economically large. For example, the highest tercile delay constrained firms curtailed R&D by 11.3% of sales in the financial crisis of 2008-2009, whereas the lowest tercile firms reduced R&D by only 0.8% of

sales. This inter-tercile range of 10.5% of sales is an economically large 16.1% of one standard deviation (the cross sectional standard deviation of R&D/sales is 65%).[11]. On the issuance side, the high delay constrained firms curtailed equity issuance by 2.5% of assets during the financial crisis, and low delay constrained firms by just 1%. This inter-tercile difference of 1.5% for equity issuance is an economically meaningful 11.0% of one standard deviation. For equity focus delay, this inter-tercile range is a larger 2.2% of assets, and it is another 1.9% of assets for private placement focused firms. The difference in response to forced mutual fund selling of the firm's equity and to our text-based real shocks are equally material.

Below we examine the link between constraints and financial policies using a multivariate panel data approach, and we control for other predictors of firm investment and issuance policies. We first use firm fixed effect panel data regressions. We then use the Arrellano-Bond Differences GMM estimator that allows for consistent estimation of models with lagged dependent variables. We consider several tests from the existing literature to assess the validity of the Arrellano-Bond method in our setting.

A Panel Regressions

In Table VII, we examine four firm policies: R&D/sales, CAPX/sales, equity issuance/assets and debt issuance/assets in year t as a function of year $t-1$ characteristics, year $t-1$ constraint measures, and year $t-1$ shocks. For each policy we estimate a simple benchmark model that predicts the firm's policy as a function of the the shock that the firm experiences and several control variables. Control variables are the log of the firm's age, log Assets, Tobin's Q and the log size of the MD&A. The independent variables of interest are our text-based shock variables (high competition, low demand, technological change, and high cost), and the 2008-2009 financial crisis. Our tests focus on the cross terms between our constraint variables and the shock variables. For these terms we expect to observe a negative and significant coefficient indicating that a firm that scores high on our constraints

[11]This estimate is conservative because economic magnitudes are even larger if we consider the subsample of firms with strictly positive R&D. This result is also not influenced by outliers as we winsorize R&D/sales at the 99% level.

index curtails the given investment or issuance policy more than a less constrained firm when it receives a shock.[12] The equations are estimated using OLS firm fixed effect regressions with industry and year fixed effects. Standard errors are adjusted for clustering at the firm level. The sample includes all firm years from 1997 to 2009 that have a machine readable Capitalization and Liquidity subsection.

[Insert Table VII Here]

Panel A of Table VII shows that firms with high delay investment scores significantly scale back both R&D and CAPX investments following negative shocks. Many of the coefficients are significant at the 5% or 1% level. For example, constrained firms curtail R&D and CAPX following the Financial Crisis of 2008-2009 at a level that is 1% or 5% significant in Panel A. Regarding issuance policy, we find that delay constrained firms also curtail equity issuance in Panel A. Overall, our results support the conclusion that our delay constraint variable is associated with afflicted firms reacting more negatively to negative shocks, consistent with a constraint interpretation. We view this conclusion as associative, and we defer a discussion of causality until the next section.

Additional results in Panel A are also in line with expectations. Firms with higher Tobin's Q invest more in both R&D and CAPX. They also issue more stock. Finally, the delay constraint variable level coefficient is positively related to investment policy and issuance policy. This finding is consistent with the conclusion that firms seeking very aggressive investment strategies might not be able to issue securities at a rate that would facilitate full funding of all their opportunities.

Panels B to E of Table VII repeat this test for four additional constraint variables: two additional new constraint measures considered in this paper, marginal equity focused delay and marginal debt focused delay, and two existing indices, the KZ index, and the WW index. The panel only shows the shock cross terms (the other variables are included in the regressions but not displayed to conserve space).

Regarding the marginal equity and debt focused delay constraints in Panels B

[12] We do not have predictions regarding the average observed levels of the shock or constraint variables in the economy since deriving a relation between these variables and the level of a policy variable requires further assumptions about equilibrium outcomes.

and C, we remind the reader that these are marginal variables. Their construction using stepwise regressions ensures that each variable describes how an equity or debt focused constrained firm is different from a regular constrained firm. To infer the total effect of being equity focus constrained, the reader should combine the effects of the delay constraint variable in Panel A and the marginal equity focused constraint variable in Panel B. Panel B shows that firms with high marginal equity focused delay scores curtail investment and equity issuance even more than delay constrained firms in Panel A. The effect of shocks on constrained firms are especially strong for equity issuance, as both constraint variables are significant in Panel A and Panel B. Because the delay investment variable and the marginal equity focus delay variable correlate little (by construction, see Table II), there exist many firms in our sample that score high on both and are thus especially sensitive to shocks.

Panel C shows that debt focused delay firms are different. These firms curtail R&D investment and equity issuance *less* than standard delay constrained firms. Because this variable is marginal, it is important to note that the positive coefficients do not imply that these firms actually increase investment during shocks, but rather, we conclude that the effects of constraints are mitigated for these firms relative to other constrained firms. These results suggest that debt focused firms have more flexibility than equity focused firms. For example, we find that equity issuance is positively related to the financial crisis variable, indicating that debt focused firms tend to substitute away from debt and toward equity when negative shocks arrive. This substitution allows these firms to avoid curtailing investment.

The results in Panel D do not support a constraint based interpretation of the KZ Index. Firms with a high KZ index increase R&D and CAPX investment in the financial crisis. For the WW Index, Panel E provides no support for a constraint based interpretation for the text shock, but the results for the financial crisis are supportive. Firms with a high WW index curtail R&D, CAPX, and equity issuance during the crisis. However, the results for the WW index are not as strong, nor as consistent across shocks, relative to the text-based constraint measures. Moreover, results presented in the next section suggest that the WW index is less robust to additional controls for endogeneity than are the text-based variables.

B Alternative Econometric Specification

The use of least squares panel regressions with firm fixed effects is standard in many studies, however, it is likely that the process driving corporate investment policies has both a firm fixed effect and an autoregressive term. In this case, such panel regressions will be biased. Disentangling the impact of firm fixed effects and the lagged dependent variable is especially critical in our setting because our panel is short in time duration at 13 years, even though we have a large number of firms in cross section (See Roodman (2009)). To address this issue we re-estimate our model using the Arrellano-Bond estimator, which eliminates this bias, while also addressing potential endogeneity concerns by using lagged variables as instruments.

An added advantage of the Arrellano-Bond estimator is that it allows for added flexibility in specifying which variable are to be taken as endogenous, pre-determined, and truly exogenous and assigning appropriate instruments to each category of variables. The quality of these designations can then be tested using standard specification tests. This analysis is important because firm-level variables often have complex links to other variables. The specification tests allow us to evaluate whether the relationships we find can be given a causal interpretation in the sense that the variables of interest are independent of the error term.

To take advantage of the ability of Arrellano-Bond estimators to address endogeneity, we follow Roodman's (2009) recipe. We first designate three variables as truly exogenous: firm age, firm size, and the 2008-2009 financial crisis dummy. Second, we designate financial constraint variables as being potentially endogenous to financial policies, and we thus identify these variables using an additional lag. We classify all other variables such as Tobin's Q as being predetermined by past data, but not fully exogenous. Our specification is conservative because we use differences GMM instead of system GMM, and we avoid the orthogonal deviations transform. Both of these choices allow us to avoid making additional assumptions. Our findings are also conservative as our results are somewhat stronger using either system GMM or orthogonal deviations (not reported). We also include year fixed effects and we adjust standard errors due to clustering by firm.

We assess the stability of our regressions in five ways. First, we test if the idiosyncratic disturbance is autocorrelated at the second lag following Arrellano and Bond (1991). If second order autocorrelation is significant, the instruments may not be valid. Second, we examine whether the coefficient for the lagged dependent variable falls within the two reasonable OLS bounds indicated in Bond (2002) and illustrated by example in Bazzi and Clemens (2009). Third, we examine the Hansen J-statistic of overidentifying restrictions. A significant J-statistic indicates improper instrumentation for endogeneity. Fourth, we consider the Hansen Differences statistic based on our two shock cross terms we draw inferences from. A significant differences statistic indicates improper instrumentation for endogeneity directly relating to these key variables. We report the results of the four tests discussed here in a row titled "regression diagnostics" at the bottom of each Arrellano-Bond model, where we indicate each test is passed using "a", "b", "c", and "d", respectively. Finally, we note that the number of instruments used by the Arrellano-Bond model outnumber groups by a factor of roughly five to ten across our specifications, far exceeding the minimum 1:1 ratio below which Roodman (2009) indicates that problems are most likely. Hence, it is unlikely that our results suffer from problems relating to too many instruments.

In Table VIII we reestimate the specifications in Table VII using the Arrellano and Bond (1991) model. The lagged dependent variable in Panel A is significant in each case indicating that investment policies do contain a relevant autoregressive component, although this component is smaller for equity issues which are known to be more lumpy. With one exception, the signs of the cross-term coefficients are negative and thus consistent with those in in Table VII. As expected when instrumental variables are used, significance levels are somewhat lower, although our results are highly robust.

[Insert Table VIII Here]

The regression diagnostics in the first two columns of Table VIII are supportive of a causal conclusion, that constraints cause amplified investment policy curtailment following negative shocks. However, the diagnostics are less conclusive for issuance

policies.

For investment policies, delay constrained firms are significantly more likely to curtail R&D and CAPX policies following shocks. These results are significant at the 1% or 5% level, and these specifications pass all four regression diagnostic tests and thus are consistent with a causal conclusion. Panels B and C show that firms that are marginally equity focused constrained curtail both forms of investment more in the financial crisis, and firms that are debt focus constrained tend to curtail policies less. We find notably weaker results for either the KZ index or the WW index for investment policies in Panels D and E respectively, suggesting that a similar conclusion is not warranted for these variables.

The results are less conclusive for issuance policies. The Hansen J test (denoted by the letter "c" in the regression diagnostics) uniformly suggests that the instruments are not sufficiently strong to draw a causal conclusion for the model as a whole. However, the models do uniformly pass the Hansen differences test (denoted by the letter "d"), which examines the issue of exogeneity for the two shock cross terms alone. Overall, the results are least conclusive of all for the debt issuance model, which generally passes only two of the four tests. Although applying additional lags can improve the diagnostic test performance of the debt issuance model, Table VIII generally shows that most variables are not significant in explaining debt issuance policy. Hence, we conclude that a causal conclusion is a possibility for equity issuance policy, but we do not find strong support for a causal conclusion regarding debt issuance policy.

C Subsample Results

We next explore key subsamples, and examine whether financial constraints are more or less important for firms based on their size, age, R&D focus, and CAPX focus. We consider the Arrellano-Bond differences GMM estimator as in Table VIII for above median and below median firms for each variable. Firms are sorted into these subsamples based on their value of the given characteristic relative to the median in the year when the given firm enters the sample. This ensures time-series continuity

for each firm, an important consideration given the nature of the Arrellano-Bond model and its use of lags.

Hadlock and Pierce (2007) (henceforth HP) find that financial constraints are most relevant for smaller and younger firms. Panels A and B of Table IX display our results for subsamples that include only small and large firms (below and above median assets), and Panels C and D display results for young and old firms (below and above median age). We find that results for both small and young firms are stronger than those for larger and older firms. These results are quite strong as their significance is maintained despite the reduced sample size. Although some results (especially relating to CAPX) remain significant for large and older firms, the table generally supports HP's conclusions regarding small and younger firms being particularly relevant. However, our results go further, as we find that only some small and young firms are constrained. Thus, we would conclude that (A) financial constraints are best measured using textual measures and (B) the sample of small and young firms is where the most relevant variation is between constrained and unconstrained (this differs quite materially from HP's conclusion that size and age are the best proxies for constrained status). Our results also suggest a tilt toward R&D for smaller and younger firms, and that some constraints still matter for larger and older firms regarding CAPX.

and that some larger and older firms are as well. Our regressions also include controls for size and age, ensuring that our findings are also distinct from those reported in HP.

[Insert Table IX Here]

It is noteworthy that the policy regressions in Panel A do well in passing the regression diagnostics, admitting the potential conclusion that both forms of investment and both forms of issuance are causally impacted by delay investment constraints for smaller firms following negative shocks.

Panels E and F of Table IX display analogous results for low and high R&D Focused firms. Results for these subsamples are especially striking. We find no significant results in Panel E for our delay constraint variable for low R&D focused firms.

In contrast, we find that delay constrained high R&D focused firms in Panel F curtail three corporate finance policies when negative shocks materialize. Many results are significant at the 5% level or better, which is striking given the reduced power associated with using half of the sample. We conclude that the type of investment a firm focuses on is important in determining the extent to which financial constraints are binding. R&D investment, which is more prone to informational asymmetry, and more likely to have uncertain outcomes, is most sensitive to constraints. Investors thus appear to be less willing to provide liquidity when investments are more informationally sensitive, and more willing to provide funding when investments are more tangible.

Panels G and H of Table IX display analogous results for low and high CAPX Focused firms. The results for CAPX are less stark than those for R&D, although it is perhaps not surprising in Panel H that firms that are more CAPX focused curtail CAPX more in a negative shock when they are constrained.

In Table X, we reexamine how constrained firms with low and high R&D Focus react to shocks, this time classifying firms in into these groups separately in each year (previous tables more conservatively classify firms only in the year they enter the sample). In our previous tests, a firm is in the low (high) R&D focused firm subsample if its text-based R&D Focus is below (above) the median level in the year the firm enters the sample. The results in Panel A of Table X are consistent with those reported previously, showing that constrained high R&D focused firms cut both investment and financing more in response to shocks than low R&D Focused firms. Panel B shows that firms that also score high on Marginal Equity Focus Delay cut Equity Issuance more for both low and high R&D Focus firms. Panel B also shows more severe curtailment of investment policies for high R&D focused firms facing constraints.

[Insert Table X Here]

In low and high R&D firms, Panel C shows that Marginal Debt Focus Delay is associated with further cuts in debt issuance following a shock. However, the high R&D focused firms also at the margin increase their equity issuance as they curtail

debt issuance. Thus, high Marginal Debt Focus Delay scores predict a substitution of equity for debt financing. There is no additional marginal effect on investment for high R&D focused firms in Panel C, suggesting that this substitution provides adequate capital to avoid investment policy curtailment. Generally, results are weaker for low R&D focused firms relative to high R&D focused firms throughout the table.

D Private Placements

In this section, we explore the role of marginal private placement focus. As discussed earlier, this variable is marginal, and the stepwise textual regression ensures that we are examining the role of private placement mentions in the text, holding fixed the degree to which firms are delay investment constrained, and also the degree to which firms are equity or debt focused constrained. This test is motivated by the finding in Gomes and Phillips (2011) that private placements are more likely to be used when asymmetric information is particularly high.

[Insert Table XI Here]

Table XI displays the results for our private placement focused variable for the overall sample (Panel A) and for various subsamples in later panels. The findings are consistent with asymmetric information playing an important role in the extent to which financial constraints are binding. Firms that are private placement focused are significantly more likely to curtail R&D and equity issuance following negative shocks. These results are marginal and in addition to the fact that many firms in this situation are also delay investment constrained and equity focused constrained. As was the case for our earlier analysis, these findings are also especially strong for the high R&D focused subsample, for younger firms, and for smaller firms. Many of these results also perform well on the regression diagnostics, and thus are consistent with a causal relationship between these variables.

E Shocks to the market for the firm's equity

In this section, we add forced mutual fund selling, and corresponding cross terms with constraint indices, to the specifications in Table VIII. We hypothesize, consistent

with Edmans, Goldstein and Jiang (2011), that this variable represents an exogenous shock to a firm's equity-market liquidity. Unlike the 2008 crisis and the text shock, which likely have both supply and demand side effects, as in Opler and Titman (1994), the forced mutual fund shock variable is uniquely a supply side shock. Our hypothesis is that shocks to this variable should result in greater curtailment of equity issuance for constrained firms relative to unconstrained firms.

[Insert Table XII Here]

Panel A of Table XII shows that the mutual fund selling shock does induce firms to curtail equity issuance policy overall. However, the lack of significance for the cross term indicates that firms with higher loadings on the delay focus constraint do not curtail their issuance differentially. In contrast, Panels B and D show that equity focus constrained firms, and private placement focus constrained firms do curtail equity issuance more when forced mutual fund selling is high. We do not find significant results for the marginal debt focus constraint, nor the KZ Index or the WW Index. These results are particularly supportive of a causal link between financial constraints and policy curtailment through the channel of equity market friction. In particular, we would expect this supply side shock to matter most for firms that are indeed equity focus constrained, and for firms that are considering private placements of equity on the margin. The fact that only these cross terms are significant, and only for the equity issuance policy and not debt issuance policy, is especially stark in supporting our key hypotheses regarding financial constraints and the role of equity versus debt focus outlined above.

V Conclusion

We develop a methodology for identifying financial constraints using mandated disclosures in firms' 10-K statements. We focus on discussions in which management summarizes their firm's ability or inability to obtain financing for planned investments, and the marginal form of external financing (debt, equity, or private placements of equity) their firm is actively considering. We use this text to construct indices of delay investment financial constraints, and financial constraints with a

debt-, equity-, or private placement- financing focus. These disclosures are required by law, and contain a great deal of information concerning potential investment delays and financing options. Our indices allow us to directly investigate financial constraints without having to rely on the assumptions of a specific model and its implications for non-constraint variables. Our text-based measures also have advantages over surveys: they are available for the entire COMPUSTAT panel from 1997 forward, they are in response to time-invariant regulation, and we do not have to extend our measures from a small survey to the whole population using statistical models based on potentially endogenous variables. Scoring is machine based, and easily replicated or extended by other researchers.

We find that text-based measures of constraints and financing focus correlate with firm characteristics in an intuitive way. For example, equity focused constrained firms are in industries with high investments, higher Tobin's Q, lower profits, lower leverage, and higher cash. Hence, they are in industries where planned investment levels and opportunities are high, and many rivals are cash rich. However, the relative position of constrained firms within these industries is such that they have lower than average investment levels (R&D and CAPX) despite having an even higher average Tobin's Q than their peers. These firms are focused more on R&D than CAPX, and these results are consistent with constraints being most severe for firms seeking the most aggressive and informationally-opaque investments. Here, firms appear unable to raise enough capital to fund all of their aggressive investment needs. These firms have high valuations due to their investment opportunities, and hence these findings run against any pre-conceived notion that financial constraints are analogous to financial distress.

In contrast, firms that are debt-focused constrained are diametrically opposite, and are from industries with lower Tobin's Q and lower investment. In terms of position, constrained firms in these industries have even lower Tobins' Q than the already-low levels of their industry peers, and higher leverage than the already high levels of their peers. Despite this, their investment levels are higher than their peers. Hence, these firms likely face constraints because lenders may see them as over-leveraged and overly risky due to their aggressive investment strategies. Interestingly,

constraints are less binding for these firms due to their ability to substitute to equity following negative shocks, allowing less interruption to their investment levels.

Firms that score high on our constraint measures curtail R&D, capital expenditures, equity issuance and debt issuance more than less constrained firms when they receive negative shocks. We also find that these curtailments are larger for firms that are equity-focus constrained and private placement-focus constrained relative to those that are debt-focus constrained. The relative magnitude of a firm's equity- and debt-delay focus score also predicts how these firms react to a negative shock. Firms with high Equity focus scores and low debt focused scores react to negative shocks by cutting investment, while maintaining their issuance policy, and thus building up their cash balances. However, firms with debt focused scores and low equity focused scores balance their cuts in investment by reducing security issuances and do not increase their cash holdings.

These results are robust across two shock variables including product market shocks (high competition, low demand, and high cost), and the 2008-2009 financial crisis. Our constraint measures also outperform other measures used in the literature, and our results are economically large. For example, firms in the most delay constrained tercile curtail R&D/Sales by 11 percentage points more than the least constrained firms during the financial crisis. Consistent with illiquidity and informational asymmetry driving financial constraints, our results are strongest for small firms, young firms, firms focused on R&D. Moreover, when we consider an exogenous shock to liquidity of the market for the firm's equity, we find that firms that score high on our equity-focused constraints and private placement focused constraints reduce subsequent issues of equity more than other firms.

Taken together, these findings suggest that researchers need to consider equity and debt market financing constraints separately when estimating the shadow price of external capital in models of financial constraints. One-dimensional measures of financial constraints, as used in the existing literature, miss much detail regarding constraint and firm policies interactions. The degree to which constraints bind also depends on the firm's situation, its preferred type of capital, and the type of investment it undertakes. Constraints are most binding when the constraint is based on

the inability to issue equity. Among investment classes, research and development is far more prone to constraints relative to capital expenditures, which are more tangible and strongly relate to debt market constraints. Our new constraint indices should have other applications and we plan to make them available on the web.

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Table I: Summary Statistics

Summary statistics for firms with machine readable 10-Ks, and having machine readable Management's Discussion and Analysis. Observations are from 1997 to 2009. We discard all financials, and require COMPUSTAT data coverage in the current year and the past year. We also discard firms with zero assets or zero sales, and require valid text data to be available. Please see Section II for a description of variables. All non-binary variables are winsorized at the 1/99% level.

Variable	Mean	Std. Dev.	Min.	Median	Max.	# Obs.
Panel A: MD&A Content (Firms with MD&A Section)						
Has Cap+Liq Subsection Dummy	0.801	0.399	0.000	1.000	1.000	52,249
MD&A R&D Focused Score	0.080	0.098	0.000	0.048	1.000	52,249
MD&A CAPX Focused Score	0.019	0.046	0.000	0.000	1.000	52,249
Panel B: Precise Text Constraint Declarations (Firms with Cap+Liq Section)						
Delay Investment Text	0.016	0.126	0.000	0.000	1.000	41,686
Equity Focused Text	0.010	0.099	0.000	0.000	1.000	41,686
Debt Focused Text	0.034	0.182	0.000	0.000	1.000	41,686
Panel C: 12-Word Text Constraint Declarations (Firms with Cap+Liq Section)						
Delay Investment Text	0.054	0.226	0.000	0.000	1.000	41,686
Equity Focused Text	0.126	0.332	0.000	0.000	1.000	41,686
Debt Focused Text	0.146	0.353	0.000	0.000	1.000	41,686
Private Placement Foc. Text	0.090	0.286	0.000	0.000	1.000	41,686
Panel D: Text Constraint Scores (Firms with Cap+Liq Section)						
Delay Investment Score	-0.013	0.110	-0.396	-0.015	0.334	41,686
Equity Focused Score	-0.018	0.064	-0.215	-0.023	0.273	41,686
Debt Focused Score	-0.001	0.087	-0.261	-0.007	0.242	41,686
Private Placement Foc. Score	-0.023	0.068	-0.244	-0.021	0.215	41,686
Panel E: Other Text Variables (Firms with Cap+Liq Section)						
Covenant Violation Score	0.037	0.103	-0.484	0.029	0.647	41,686
Log # Words in Cap+Liq Section	8.304	0.855	3.951	8.407	11.315	41,686
Panel F: Text-Based Shock Variables (Firms having valid MD&A)						
High Competition Dummy	0.138	0.345	0.000	0.000	1.000	52,249
Low Demand Dummy	0.120	0.325	0.000	0.000	1.000	52,249
High Cost Dummy	0.140	0.347	0.000	0.000	1.000	52,249
Panel G: Corporate Policy Variables						
R&D/Sales	0.166	0.713	0.000	0.000	10.224	52,249
CAPX/Sales	0.107	0.263	-0.000	0.038	4.328	52,249
Equity Issuance/Assets	0.049	0.134	-0.000	0.005	1.185	52,249
Debt Issuance/Assets	0.102	0.209	0.000	0.001	1.476	52,249

Table II: Pearson Correlation Coefficients (Investment and Constraint Measures)

The table displays Pearson Correlation Coefficients between various measures of financial constraints and financial distress. The first six variables are text-based measures of investment opportunities (the first three being derived from the entire MD&A, and the latter three derived from the Capitalization and Liquidity subsection ("Capliq"). We also include our three constraint variables based on investment delay, equity focused delay, and debt focused delay. Finally, we include the covenant violation score. In addition to the text variables, we include correlations with firm size, the KZ index, the WW index, and the Altman Z-score. Please see Section II for a description of variables. Finally, we consider firm size and three existing measures of financial constraints and distress used in the existing literature: the KZ index, the WW index, and the Altman Z score.

Row	Variable	Delay Invest. Score	Equity Focused Score	Debt Focused Score	Private Placement Focused Score	Cov-enant Viol. Score	Size (Log Assets)	KZ Index	WW Index	MD&A R&D Focused Score
					Correlation Coefficients					
	Equity Focused Delay Score	-0.009								
	Debt Focused Delay Score	0.046	-0.091							
	Private Place. Foc. Delay Score	0.063	0.010	-0.237						
	Covenant Violation Score	-0.038	-0.138	0.655	-0.447					
	Log Assets	-0.030	-0.127	0.132	0.004	0.038				
	KZ Index	0.032	–0.108	0.145	–0.096	0.164	0.091			
	WW Index	0.051	0.131	–0.115	0.011	–0.037	–0.956	–0.046		
	MD&A R&D Focused Score	0.146	0.158	-0.207	0.109	-0.203	-0.229	-0.154	0.277	
	MD&A CAPX Focused Score	0.022	-0.060	0.056	-0.019	0.041	0.174	0.072	-0.174	-0.028

Table III: Time Series Statistics (All Firms)

The table displays annual means of various measures of financial constraints, investment focus, and financial shocks. ***, **, and * denote significant changes relative to the previous year at the 1%, 5%, and 1% level, respectively. All variables are text-based. Please see Section II for a full description of variables.

Year	Precise Delay Dummy	12-Win. Delay Dummy	Precise Delay x Equity Dummy	12-Win. Delay x Equity Dummy	Precise Delay x Debt Dummy	12-Win. Delay x Debt Dummy	% MDA R&D Focus	% MDA CAPX Focus	High Compet. Dummy	Low Demand Dummy	High Cost Dummy	# Obs.
						Panel A: All Firms						
1997	1.529	5.310	0.054	1.904	0.188	1.153	0.105	0.019	0.140	0.066	0.118	3729
1998	1.608	5.851	0.079	1.792	0.105	1.107	0.099	0.017	0.146	0.084	0.114	3794
1999	1.515	5.107	0.000	1.599	0.168	1.263	0.100	0.017	0.146	0.093	0.116	3564
2000	1.528	5.744	0.085*	1.839	0.085	1.047	0.101	0.018	0.156	0.099	0.113	3534
2001	1.687	5.791	0.141	1.771	0.028	0.900	0.096	0.019	0.175	0.156	0.144	3557
2002	1.729	5.455	0.119	1.759	0.030	0.745	0.091	0.020	0.189	0.192	0.167	3355
2003	1.857	4.688	0.094	1.290	0.094	0.661	0.091	0.022	0.216	0.172	0.173	3178
2004	1.523	4.470	0.130	1.296	0.000	0.615	0.090	0.021	0.233	0.164	0.191	3087
2005	1.250	4.837	0.033**	1.185	0.000	0.888	0.086	0.022	0.160**	0.127	0.201	3039
2006	1.030	4.394	0.000	1.133	0.000	0.961	0.080	0.023	0.129	0.116	0.199	2913
2007	1.471	4.834	0.035	1.436	0.070	0.911	0.080	0.022	0.124	0.117	0.186	2855
2008	2.427**	7.095***	0.075	2.278**	0.112	1.158	0.074	0.023	0.114	0.185	0.203	2678
2009	2.336	6.737	0.000	2.064	0.078	0.935	0.071	0.025	0.110	0.258	0.192	2568
						Panel B: Large Firms						
1997	1.340	4.558	0.054	1.716	0.214	1.340	0.081	0.025	0.148	0.078	0.130	1865
1998	1.318	5.008	0.105	1.265	0.105	1.265	0.074	0.022	0.168	0.096	0.122	1897
1999	0.954	4.097	0.000**	1.066	0.112	1.291	0.076	0.023	0.174	0.112	0.137	1782
2000	1.415	4.810	0.000	1.641	0.113	1.132	0.084	0.024	0.170	0.123	0.131	1767
2001	1.180	4.103	0.056	0.843**	0.000	0.787	0.081	0.025	0.189	0.192	0.151	1779
2002	1.371	3.874	0.060	0.954	0.060	0.715	0.075	0.025	0.204	0.234	0.187	1678
2003	1.699	3.713	0.063	0.566	0.189*	0.629	0.076	0.028	0.226	0.193	0.207	1589
2004	1.036	2.850	0.130	0.648	0.000***	0.518	0.073	0.027	0.266	0.185	0.217	1544
2005	0.855	3.224	0.000***	0.461	0.000	0.658	0.067	0.029	0.195*	0.155	0.230	1520
2006	0.755	2.745	0.000	0.480	0.000	0.755	0.062	0.031	0.150	0.148	0.237	1457
2007	1.190	3.221	0.000	0.630	0.140*	0.770	0.060	0.029	0.142	0.150	0.228	1428
2008	2.166**	5.228**	0.000	0.896	0.149	1.344*	0.055	0.030	0.139	0.244	0.252	1339
2009	1.947	4.751	0.000	1.012	0.078	0.857	0.053	0.033	0.129	0.345	0.249	1284
						Panel C: Small Firms						
1997	1.717	6.062	0.054	2.092	0.161	0.966	0.129	0.013	0.131	0.054	0.106	1864
1998	1.898	6.695	0.053	2.319	0.105	0.949	0.124	0.012	0.124	0.072	0.107	1897
1999	2.076	6.117	0.000	2.132	0.224	1.235*	0.125	0.012	0.117	0.073	0.094	1782
2000	1.641	6.678	0.170**	2.037	0.057**	0.962	0.118	0.013	0.143	0.075	0.095	1767
2001	2.193	7.480	0.225	2.700	0.056	1.012	0.112	0.013	0.162	0.120	0.137	1778
2002	2.087	7.036	0.179	2.564	0.000	0.775	0.106	0.015	0.174	0.149	0.147	1677
2003	2.014	5.664	0.126	2.014	0.000	0.692	0.106	0.016	0.207	0.152	0.140	1589
2004	2.009	6.092	0.130	1.944	0.000	0.713	0.107	0.015	0.200	0.144	0.165	1543
2005	1.646	6.452	0.066	1.909	0.000	1.119**	0.105	0.015	0.124**	0.099	0.172	1519
2006	1.305	6.044	0.000	1.786	0.000	1.168	0.098	0.014	0.108	0.084	0.161	1456
2007	1.752	6.447	0.070	2.242	0.000	1.051	0.099	0.015	0.107	0.084	0.145	1427
2008	2.689**	8.962**	0.149	3.659***	0.075	0.971	0.093	0.016	0.089	0.125	0.154	1339
2009	2.726	8.723	0.000**	3.115	0.078	1.012	0.089	0.017	0.090	0.171	0.134	1284

Table IV: Capitalization and Liquidity Subsection and Firm Characteristics

Panel data Logistic regressions with firm and year fixed effects. The sample includes all firm years from 1997 to 2009. The dependent variable is a dummy equal to one when the given firm's MD&A has a distinct Capitalization and Liquidity subsection. Standard errors are adjusted for clustering at the firm level. The independent variables include various firm characteristics. Please see Section II for a full discussion of variable definitions.

Row	Log Assets	Log Age	oi/ Sales	Cash Assets	Tobin's Q	Book Leverage	Dividend Payer	MD&A R&D Focus	MD&A CAPX Focus	#obs
					Panel A: SIC-3 industry and year fixed effects					
(1)	–0.2558	–0.3649								45,948
	(–14.650)	(–11.310)								
(2)	–0.2463	–0.3567	–0.0658	0.3961						45,948
	(–13.930)	(–11.060)	(–2.000)	(1.960)						
(3)	–0.2055	–0.2652	–0.0471	0.6539	–0.0129	0.5142	–0.6944			45,948
	(–11.180)	(–8.170)	(–1.510)	(3.050)	(–0.980)	(3.620)	(–10.290)			
(4)	–0.1977	–0.2516	0.0661	0.2823	–0.0455	0.7139	–0.6024	8.8824	2.8568	45,948
	(–10.850)	(–8.170)	(2.620)	(1.330)	(–3.480)	(5.120)	(–9.080)	(11.260)	(2.250)	
					Panel B: Firm and year fixed effects					
(5)	–0.1195	–0.4783								45,948
	(–2.500)	(–5.100)								
(6)	–0.1209	–0.4786	0.0039	–0.0431						45,948
	(–2.500)	(–5.100)	(0.090)	(–0.170)						
(7)	–0.1038	–0.4690	0.0009	–0.0861	0.0217	–0.0423	–0.1715			45,948
	(–2.100)	(–5.000)	(0.020)	(–0.330)	(1.210)	(–0.230)	(–1.700)			
(8)	–0.1214	–0.4451	0.0277	0.0372	0.0043	0.0920	–0.1670	9.0670	0.8143	45,948
	(–2.410)	(–4.770)	(0.640)	(0.140)	(0.230)	(0.480)	(–1.630)	(21.580)	(1.400)	

Table V: Firm Characteristics and Constraint Variables

OLS regressions. Dependent variables specified by row. This panel only includes firms (80.1% of all firms) that have a CAP+LIQ Section. Industry specific variables are computed using TNIC industries as in Hoberg and Phillips (2010, 2011). Firm specific components are computed as a firm's raw value for the specific characteristic minus the industry value. All regressions include time and three digit SIC fixed effects. All standard errors are adjusted for clustering by firm.

Row	Dependent Variable	Delay Invest Score	Equity Focused Score	Debt Focused Score	Private Placement Score	Log # Words in CAP+LIQ	Log Firm Age	Log Assets	# Obs. / RSQ
(1)	Tobin's Q (Industry Specific)	0.796	1.817	-1.287	1.513	0.025	-0.092	-0.018	36,090
		(11.69)	(17.34)	(-16.10)	(14.48)	(3.13)	(-10.72)	(-3.66)	0.412
(2)	Tobin's Q (Firm Specific)	0.108	1.167	-0.711	0.894	-0.004	-0.027	-0.038	36,090
		(0.83)	(5.86)	(-5.26)	(4.80)	(-0.34)	(-1.89)	(-3.89)	0.026
(3)	Dividend Payer (Industry Specific)	-0.038	-0.170	0.143	-0.214	-0.013	0.033	0.014	36,090
		(-2.51)	(-7.27)	(7.96)	(-9.75)	(-6.27)	(13.07)	(10.36)	0.460
(4)	Dividend Payer (Firm Specific)	0.009	0.166	-0.346	-0.065	-0.011	0.067	0.045	36,090
		(0.31)	(3.70)	(-9.50)	(-1.47)	(-2.74)	(14.02)	(17.86)	0.112
(5)	oi/sales (Industry Specific)	-0.211	-0.407	0.208	-0.308	-0.012	0.019	0.010	36,090
		(-12.86)	(-17.12)	(13.34)	(-15.63)	(-7.40)	(10.36)	(9.05)	0.516
(6)	oi/sales (Firm Specific)	-1.142	-1.963	0.579	-0.850	-0.047	0.069	0.082	36,090
		(-10.86)	(-12.47)	(7.87)	(-7.44)	(-5.53)	(8.23)	(16.57)	0.125
(7)	oi/assets (Industry Specific)	-0.124	-0.262	0.145	-0.191	-0.008	0.014	0.007	36,090
		(-12.26)	(-17.64)	(14.54)	(-15.49)	(-7.31)	(12.37)	(9.88)	0.489
(8)	oi/assets (Firm Specific)	-0.188	-0.356	0.020	-0.193	-0.016	0.003	0.039	36,090
		(-11.17)	(-12.83)	(1.17)	(-8.42)	(-8.63)	(1.81)	(28.59)	0.152
(9)	cash/assets (Industry Specific)	0.056	0.145	-0.130	0.123	0.004	-0.010	-0.004	36,090
		(8.53)	(15.34)	(-18.19)	(14.54)	(5.73)	(-11.98)	(-7.74)	0.530
(10)	cash/assets (Firm Specific)	-0.019	0.030	-0.153	0.071	-0.003	-0.001	-0.011	36,090
		(-1.63)	(1.78)	(-12.72)	(4.77)	(-2.79)	(-1.01)	(-14.44)	0.048
(11)	Book Leverage (Industry Specific)	-0.004	-0.075	0.118	-0.084	-0.001	0.004	0.005	36,090
		(-0.57)	(-7.20)	(13.17)	(-8.41)	(-0.74)	(3.60)	(8.75)	0.499
(12)	Book Leverage (Firm Specific)	0.061	0.054	0.344	-0.020	0.021	-0.009	0.012	36,090
		(3.53)	(2.14)	(17.54)	(-0.91)	(9.96)	(-3.66)	(10.11)	0.063
(13)	Market Leverage (Industry Specific)	-0.021	-0.100	0.120	-0.100	-0.001	0.005	0.004	36,090
		(-3.18)	(-10.72)	(15.25)	(-10.96)	(-1.72)	(5.42)	(7.66)	0.516
(14)	Market Leverage (Firm Specific)	0.021	-0.031	0.298	-0.053	0.015	-0.009	0.009	36,090
		(1.74)	(-1.76)	(19.73)	(-3.05)	(9.51)	(-4.71)	(10.25)	0.072
(15)	CAPX/sales (Industry Specific)	0.247	0.245	-0.114	0.248	0.013	-0.020	-0.002	36,090
		(14.24)	(9.21)	(-6.08)	(10.77)	(6.89)	(-9.43)	(-1.36)	0.467
(16)	CAPX/sales (Firm Specific)	-0.058	-0.068	0.090	-0.020	-0.004	-0.005	0.009	36,090
		(-2.92)	(-2.19)	(4.18)	(-0.72)	(-1.77)	(-2.01)	(7.03)	0.105
(17)	R+D/sales (Industry Specific)	1.416	2.243	-1.045	0.837	0.048	-0.082	-0.035	36,090
		(11.29)	(12.40)	(-9.78)	(6.29)	(4.18)	(-6.39)	(-4.71)	0.479
(18)	R+D/sales (Firm Specific)	-0.552	-0.838	0.393	-0.294	-0.015	0.030	0.015	36,090
		(-4.96)	(-5.18)	(4.26)	(-2.50)	(-1.41)	(3.04)	(2.30)	0.298

Table VI: Investment Policies versus Constraint Cross Terms (Economic Magnitudes)

Economic Magnitudes of Interactions between policy variables and constraint variables during each of the two shocks considered in this paper. We consider the two shocks as noted in Panels A and B. For each shock, we consider the difference in each policy for treated firms minus the policy level for non-treated firms. For the financial crisis, the treated value is the firm's value in 2009, and the untreated value is the firm's value of the given policy in 2007. For the text shock, the treated value is the average policy for firms experiencing at least one of the three text shocks (low demand, high competition, or high cost) and the untreated value is the average policy for firms experiencing none of the three text shocks. Note that because each of the policy variables is scaled by sales or assets, that the reported mean changes are in fractional units of sales or assets, respectively.

Constraint Variable and Tercile (1 to 3)	Change in R&D/Sales	Change in CAPX/Sales	Change in Equity Issuance /Assets	Change in Debt Issuance /Assets
Panel A: Financial Crisis Change from 2007 to 2009				
delay constraint 1	-0.008	-0.018	-0.010	-0.015
delay constraint 2	-0.040	-0.023	-0.015	-0.030
delay constraint 3	-0.113	-0.065	-0.025	-0.025
equity focus delay 1	-0.014	-0.040	-0.007	-0.031
equity focus delay 2	-0.046	-0.022	-0.014	-0.020
equity focus delay 3	-0.099	-0.044	-0.029	-0.020
debt focus delay 1	-0.082	-0.024	-0.017	-0.003
debt focus delay 2	-0.048	-0.034	-0.018	-0.023
debt focus delay 3	-0.029	-0.048	-0.015	-0.044
private placement focus delay 1	-0.046	-0.034	-0.008	-0.025
private placement focus delay 2	-0.056	-0.023	-0.015	-0.013
private placement focus delay 3	-0.057	-0.049	-0.027	-0.033
Panel B: Text Shock (high minus low)				
delay constraint 1	-0.013	-0.010	-0.010	-0.012
delay constraint 2	-0.032	-0.010	-0.013	-0.014
delay constraint 3	-0.279	-0.026	-0.040	-0.002
equity focus delay 1	-0.006	-0.006	-0.004	-0.013
equity focus delay 2	-0.050	-0.007	-0.012	-0.012
equity focus delay 3	-0.242	-0.029	-0.040	-0.005
debt focus delay 1	-0.198	-0.032	-0.035	-0.013
debt focus delay 2	-0.077	0.000	-0.016	-0.012
debt focus delay 3	-0.027	-0.009	-0.007	-0.008
private placement focus delay 1	-0.067	-0.005	-0.012	-0.006
private placement focus delay 2	-0.102	-0.015	-0.019	-0.014
private placement focus delay 3	-0.147	-0.022	-0.030	-0.009
Panel C: Mutual Fund Selling (high minus low)				
delay constraint 1	-0.039	0.000	-0.027	-0.011
delay constraint 2	-0.050	-0.000	-0.028	-0.004
delay constraint 3	-0.144	0.000	-0.062	-0.002
equity focus delay 1	-0.009	0.014	-0.011	-0.013
equity focus delay 2	-0.070	-0.002	-0.032	0.002
equity focus delay 3	-0.131	-0.014	-0.067	-0.010
debt focus delay 1	-0.136	-0.020	-0.059	-0.002
debt focus delay 2	-0.069	0.002	-0.041	-0.006
debt focus delay 3	-0.035	0.013	-0.018	-0.014
private placement focus delay 1	0.000	0.006	-0.016	-0.017
private placement focus delay 2	-0.075	-0.004	-0.042	-0.004
private placement focus delay 3	-0.175	-0.006	-0.062	0.003

Table VII: Investment Policies versus Constraint Cross Terms (Firm Fixed Effects)

Panel data OLS regressions with industry and year fixed effects. The sample includes all firm years from 1997 to 2009 that have a machine readable Capitalization and Liquidity subsection. The dependent variable is firm level equity issuance/assets, debt issuance/assets, R&D/sales, or CAPX/ sales as noted by column. All independent variables are lagged one year. We examine a different constraint index and its interactions as noted in each Panel header. All panels are based on regressions that include all of the variables shown in Panel A. However, Panels B through E only display the cross terms we draw inferences from in order to conserve space. Standard errors are adjusted for clustering at the firm level. The independent variables include our key text-based investment and constraint variables, and our text-based shock variables (high competition, low demand, technological change, and high cost). We also consider cross terms including our constraint variables and the shock variables, in addition to a 2008-9 dummy. We do not directly include a 2008-9 dummy because we control for time fixed effects. Please see Section II for a full discussion of variable definitions. ***, **, * denote significance at the 1%, 5%, 10% levels, respectively.

Variable Name	Dependent Variable= R&D/Sales	Dependent Variable= CAPX/Sales	Dependent Variable= Equity Issuance	Dependent Variable= Debt Issuance
Panel A: Constraint Index = Delay Investment Score				
Text Shock	0.0018	–0.0007	–0.0010	–0.0034
Constraint Index	0.2620***	0.0608***	0.0744***	0.0173
Log Firm Age	–0.0399***	–0.0184***	–0.0136***	0.0106
Log Size of MD&A	0.0000	0.0000***	0.0000***	0.0000
Log Assets	0.0172**	0.0237***	–0.0474***	–0.0164***
Tobins Q	0.0092**	0.0102***	0.0138***	0.0002
Text Shock x Index	–0.1098***	–0.0360***	–0.0212**	–0.0100
2008–9 Dummy x Index	–0.2203**	–0.0581**	–0.0553***	–0.0390
Panel B: Constraint Index = Marginal Equity Focus Delay				
Text Shock x Index	0.0033	0.0437**	–0.0294*	–0.0086
2008–9 Dummy x Index	–0.7015***	–0.1416***	–0.1526***	–0.1241***
Panel C: Constraint Index = Marginal Debt Focus Delay				
Text Shock x Index	–0.0226	0.0189	0.0089	0.0013
2008–9 Dummy x Index	0.1777*	0.0278	0.0663***	–0.0272
Panel D: Constraint Index = KZ Index				
Text Shock x Index	0.0061	0.0083	–0.0052	–0.0008
2008–9 Dummy x Index	0.0871	0.0188*	–0.0027	–0.0059
Panel E: Constraint Index = WW Index				
Text Shock x Index	0.0212	0.0277**	–0.0035	–0.0026
2008–9 Dummy x Index	–0.1761**	–0.0646***	–0.1596***	–0.0506

Table VIII: Investment Policies versus Constraint Cross Terms (Arrellano-Bond)

The table displays the results of Arrellano-Bond regressions using differences GMM including year fixed effects. The dependent variable is firm level equity issuance/assets, debt issuance/assets, R&D/sales, or CAPX/ sales as noted by column. All independent variables are lagged one year. We examine a different constraint index and its interactions as noted in each Panel header. All panels are based on regressions that include all of the variables shown in Panel A. However, Panels B through E only display the cross terms we draw inferences from in order to conserve space. The independent variables include our key text-based investment and constraint variables, and our text-based shock variables (high competition, low demand, technological change, and high cost). We also consider cross terms including our constraint variables and the shock variables, in addition to a 2008-9 dummy. Please see Section II for a full discussion of variable definitions. ***, **, * denote significance at the 1%, 5%, 10% levels, respectively. We also report the results of four regression diagnostic tests. A specification includes the letter "a" if the idiosyncratic disturbance is not autocorrelated at the second lag at the 5% level, following Arrellano and Bond (1991). A specification includes the letter "b" if the lagged dependent variable falls within the two reasonable OLS bounds indicated in Roodman (2009). A specification includes the letter "c" if the Hansen J statistic of overidentifying restrictions is not significant at the 5% level. A specification includes the letter "d" if the two shock cross terms have a Hansen Differences statistic that is not significant at the 5% level, consistent with a failure to reject their being exogenous. A specification including all four letters passes all four tests. We also note that our instruments outnumber groups by a factor of roughly ten across specifications, far exceeding the minimum 1:1 ratio below which Roodman (2009) indicates problems are most likely.

Variable Name	Dependent Variable= R&D/Sales	Dependent Variable= CAPX/Sales	Dependent Variable= Equity Issuance	Dependent Variable= Debt Issuance
		Panel A: Constraint Index = Delay Investment Score		
Lagged Dep. Var.	0.3255***	0.3101***	0.0559***	0.0373***
Text Shock	0.0028	–0.0048**	0.0043**	0.0014
Constraint Index	0.0744	0.1144**	–0.0263	0.0716
Log Firm Age	–0.0245	–0.0137	–0.0133	–0.0115
Log Size of MD&A	0.0017	–0.0007	0.0005	0.0002
Log Assets	0.0577***	–0.0123**	–0.1028***	–0.1191***
Tobins Q	0.0070**	0.0059***	0.0088***	–0.0104***
Text Shock x Index	–0.1404	–0.0900***	0.0037	–0.0414
2008–9 Dummy x Index	–0.4075***	–0.1362***	–0.0685**	–0.0443
Regression Diagnostics	a, b, c, d	a, b, c, d	a, b, d	b, d
		Panel B: Constraint Index = Marginal Equity Focus Delay		
Text Shock x Index	–0.1981	–0.1293***	–0.1126***	–0.0645
2008–9 Dummy x Index	–0.7147**	–0.1461*	–0.3505***	–0.0535
Regression Diagnostics	a, b, c, d	a, b, c, d	a, b, d	b, d
		Panel C: Constraint Index = Marginal Debt Focus Delay		
Text Shock x Index	–0.1289	0.1047***	0.0502**	–0.0057
2008–9 Dummy x Index	0.2766**	–0.0180	0.1132***	–0.0948*
Regression Diagnostics	a, b, c, d	a, b, c, d	a, b, d	b, d
		Panel D: Constraint Index = KZ Index		
Text Shock x Index	0.0567	–0.0153	0.0291*	–0.0117
2008–9 Dummy x Index	0.0214	–0.0321**	0.0442***	–0.0028
Regression Diagnostics	a, b, c, d	b, c, d	a, b, d	b, d
		Panel E: Constraint Index = WW Index		
Text Shock x Index	0.0363	0.0006	0.0232	0.0069
2008–9 Dummy x Index	–0.1476*	–0.0077	–0.1063***	0.0146
Regression Diagnostics	a, b, c, d	b, c, d	a, b, d	b, d

Table IX: Investment Policies versus Constraint Cross Terms (Arrellano-Bond) (Various Subsamples)

The table displays the results of Arrellano-Bond regressions using differences GMM including year fixed effects for subsamples based on firm size, firm age, R&D Focus, and CAPX Focus. The dependent variable is firm level equity issuance/assets, debt issuance/assets, R&D/sales, or CAPX/ sales as noted by column. All independent variables are lagged one year. Each Panel displays the cross terms for a regression model that is the same as in Panel A of Table VIII (see header for details), except that we examine a different constraint variable in each Panel as noted in the Panel header. ***, **, * denote significance at the 1%, 5%, 10% levels, respectively. We also report the results of four regression diagnostic tests, as also summarized in Table VIII.

Variable Name	Dependent Variable= R&D/Sales	Dependent Variable= CAPX/Sales	Dependent Variable= Equity Issuance	Dependent Variable= Debt Issuance
Panel A: Constraint Index = Delay Investment Score [SMALL FIRMS]				
Text Shock x Index	–0.3312**	–0.0891**	0.0292	–0.0622*
2008–9 Dummy x Index	–0.3331	–0.1368*	–0.1674***	–0.0331
Regression Diagnostics	a, b, c, d	a, b, c, d	a, b, d	a, b, c, d
Panel B: Constraint Index = Delay Investment Score [LARGE FIRMS]				
Text Shock x Index	–0.0708	–0.0794**	0.0036	0.0138
2008–9 Dummy x Index	–0.1602	–0.1542***	0.0102	–0.0432
Regression Diagnostics	d	a, c, d	a, b, d	d
Panel C: Constraint Index = Delay Investment Score [YOUNG FIRMS]				
Text Shock x Index	–0.1285	–0.1169***	–0.0065	–0.0298
2008–9 Dummy x Index	–0.5644**	–0.1360**	–0.0821*	–0.1319**
Regression Diagnostics	a, b, c, d	b, c, d	a, b, d	a, c, d
Panel D: Constraint Index = Delay Investment Score [OLD FIRMS]				
Text Shock x Index	–0.0927	–0.0457	–0.0103	0.0205
2008–9 Dummy x Index	–0.1102	–0.0893*	–0.0113	0.0855
Regression Diagnostics	a, d	a, c, d	a, b, d	b, c, d
Panel E: Constraint Index = Delay Investment Score [LOW R&D FOCUS FIRMS]				
Text Shock x Index	0.0164	0.0108	0.0362	0.0630
2008–9 Dummy x Index	0.0289	–0.0417	–0.0198	–0.0577
Regression Diagnostics	a, d	a, b, c, d	a, b, c, d	c, d
Panel F: Constraint Index = Delay Investment Score [HIGH R&D FOCUS FIRMS]				
Text Shock x Index	–0.2038	–0.1716***	–0.0273	–0.0501
2008–9 Dummy x Index	–0.6886**	–0.1928**	–0.1372**	–0.0538
Regression Diagnostics	a, b, c, d	b, c, d	a, b, d	b, c, d
Panel G: Constraint Index = Delay Investment Score [LOW CAPX FOCUS FIRMS]				
Text Shock x Index	–0.0506	–0.0128	0.0119	0.0214
2008–9 Dummy x Index	–0.0112	0.0374*	–0.0924***	–0.0380
Regression Diagnostics	c, d	c, d	a, b, d	a, b, c, d
Panel H: Constraint Index = Delay Investment Score [HIGH CAPX FOCUS FIRMS]				
Text Shock x Index	–0.1709	–0.1307***	–0.0058	–0.0284
2008–9 Dummy x Index	–0.4845**	–0.1933***	–0.0120	–0.0619
Regression Diagnostics	a, b, c, d	a, b, d	a, b, d	d

Table X: Investment Policies versus Constraint Cross Terms (Arrellano-Bond) (Time-Updated Model) (Low vs High R&D Focus Firms)

The table displays the results of Arrellano-Bond regressions using differences GMM including year fixed effects for cross terms for low R&D focused firms or high R&D focused firms. A firm is in the low (high) R&D focused firm subsample if its text-based R&D focus is below (above) the median level in the year the firm enters the sample. Unlike previous tables, we classify firms into these groups separately in each year (previous tables more conservatively classify firms only in the year they enter the sample). The dependent variable is firm level equity issuance/assets, debt issuance/assets, R&D/sales, or CAPX/ sales as noted by column. All independent variables are lagged one year. Each Panel displays the cross terms for a regression model that is the same as in Panel A of Table VIII (see header for details), except that we examine a different constraint variable in each Panel as noted in the Panel header. ***, **, * denote significance at the 1%, 5%, 10% levels, respectively. We also report the results of four regression diagnostic tests. A specification includes the letter "a" if the idiosyncratic disturbance is not autocorrelated at the second lag at the 5% level, following Arrellano and Bond (1991). A specification includes the letter "b" if the lagged dependent variable falls within the two reasonable OLS bounds indicated in Roodman (2009). A specification includes the letter "c" if the Hansen J statistic of overidentifying restrictions is not significant at the 5% level. A specification includes the letter "d" if the two shock cross terms have a Hansen Differences statistic that is not significant at the 5% level, consistent with a failure to reject their being exogenous. A specification including all four letters passes all four tests. We also note that our instruments outnumber groups by a factor of roughly ten across specifications, far exceeding the minimum 1:1 ratio below which Roodman (2009) indicates problems are most likely.

Variable Name	Dependent Variable= R&D/Sales	Dependent Variable= CAPX/Sales	Dependent Variable= Equity Issuance	Dependent Variable= Debt Issuance
Panel A: Constraint Index = Delay Investment Score				
Text Shock x Index x High R&D	–0.3124**	–0.1460***	–0.0203	–0.0568*
2008–9 Dummy x Index x High R&D	–0.6975**	–0.1626**	–0.1560***	–0.0353
Text Shock x Index x Low R&D	0.1114**	0.0050	0.0414*	0.0339
2008–9 Dummy x Index x Low R&D	–0.0242	–0.0799	0.0132	–0.0655
Regression Diagnostics	a, b, c, d	b, d	a, b, d	b, c, d
Panel B: Constraint Index = Marginal Equity Focus Delay				
Text Shock x Index x High R&D	–0.4617*	–0.1355**	–0.0970	–0.0084
2008–9 Dummy x Index x High R&D	–1.6522***	–0.2055*	–0.4617***	–0.0286
Text Shock x Index x Low R&D	0.1689	–0.0932	–0.1176***	–0.1469*
2008–9 Dummy x Index x Low R&D	0.2114	–0.0401	–0.1191**	–0.1937
Regression Diagnostics	a, b, c, d	a, b, c, d	a, b, d	b, d
Panel C: Constraint Index = Marginal Debt Focus Delay				
Text Shock x Index x High R&D	–0.2807	0.0569	0.0975**	–0.0168
2008–9 Dummy x Index x High R&D	0.1639	–0.1260	0.2128***	–0.1486*
Text Shock x Index x Low R&D	0.0252	0.0921***	–0.0084	–0.0377
2008–9 Dummy x Index x Low R&D	0.0717	–0.0010	–0.0216	–0.1311*
Regression Diagnostics	a, b, c, d	a, b, c, d	a, b, d	b, d

Table XI: The Marginal Role of Equity Private Placements (Arrellano-Bond)

The table displays the results of Arrellano-Bond regressions using differences GMM including year fixed effects. The dependent variable is firm level equity issuance/assets, debt issuance/assets, R&D/sales, or CAPX/ sales as noted by column. All independent variables are lagged one year. The key independent variables of interest in all panels are the cross terms between the two economic shock variables and the marginal private placement focused delay constraint variable. Each Panel displays the results for a regression model based on the whole sample (Panel A) or based on various subsamples (all other panels). All regressions include the full set of variables used in Panel A of Table VIII (see header for details), except that we only display the key cross terms to conserve space. ***, **, * denote significance at the 1%, 5%, 10% levels, respectively. We also report the results of four regression diagnostic tests, as also summarized in Table VIII.

Variable Name	Dependent Variable= R&D/Sales	Dependent Variable= CAPX/Sales	Dependent Variable= Equity Issuance	Dependent Variable= Debt Issuance
		Panel A: Whole Sample		
Text Shock x Index	–0.0270	–0.0760*	–0.1499***	0.0144
2008–9 Dummy x Index	–0.5186**	–0.1031	–0.1783***	0.0756
Regression Diagnostics	a, b, c, d	a, b, c, d	a, b, d	b, d
		Panel B: Small Firms		
Text Shock x Index	0.0703	–0.1941***	–0.2404***	–0.0098
2008–9 Dummy x Index	–0.3550	–0.1176	–0.3633***	0.1607
Regression Diagnostics	a, b, c, d	a, b, c, d	a, b, d	a, b, c, d
		Panel C: Large Firms		
Text Shock x Index	–0.0270	0.0452	0.0001	0.0801
2008–9 Dummy x Index	–0.6190***	–0.0305	–0.0519	0.1456
Regression Diagnostics	d	a, c, d	a, b, c, d	b, d
		Panel D: Young Firms		
Text Shock x Index	0.0788	–0.0807	–0.2069***	–0.0763
2008–9 Dummy x Index	–0.5163	0.1006	–0.2053**	0.1521
Regression Diagnostics	a, b, c, d	b, c, d	a, b, c, d	a, d
		Panel E: Old Firms		
Text Shock x Index	–0.2127**	–0.0403	–0.0505	0.0576
2008–9 Dummy x Index	–0.1739	–0.1231	–0.1615**	0.0502
Regression Diagnostics	a, d	a, d	a, b, c, d	b, c, d
		Panel F: Low R&D Focus Firms		
Text Shock x Index	–0.0049	–0.0097	–0.0350	0.0549
2008–9 Dummy x Index	0.0752*	–0.0759	–0.0183	0.0548
Regression Diagnostics	a, c, d	a, b, c, d	a, b, d	d
		Panel F: High R&D Focus Firms		
Text Shock x Index	0.0412	–0.1029*	–0.2218***	–0.0332
2008–9 Dummy x Index	–0.7726*	0.0176	–0.3626***	0.2729**
Regression Diagnostics	a, b, c, d	b, c, d	a, b, d	b, c, d
		Panel F: Low CAPX Focus Firms		
Text Shock x Index	0.0061	–0.0157	–0.0688*	–0.0465
2008–9 Dummy x Index	–0.1526	–0.1110**	–0.1613**	–0.2665*
Regression Diagnostics	c, d	c, d	a, b, c, d	a, b, c, d
		Panel F: High CAPX Focus Firms		
Text Shock x Index	0.0218	–0.1359**	–0.1799***	0.0744
2008–9 Dummy x Index	–0.6711**	–0.1165	–0.2246**	0.2540*
Regression Diagnostics	a, b, c, d	a, b, c, d	a, b, d	d

Table XII: Investment Policies versus Mutual Fund Selling Cross Terms (Arrellano-Bond)

The table displays the results of Arrellano-Bond regressions using differences GMM including year fixed effects. The dependent variable is firm level equity issuance/assets, or debt issuance/assets as noted by column. All independent variables are lagged one year. We examine a different constraint index and its interactions as noted in each Panel header. Each Panel displays the cross terms for a regression model that includes all variables displayed in Panel A of Table VIII (see header for details), but with two exceptions. First, we examine a different constraint variable in each Panel as noted in the Panel header. Second, we add forced mutual fund selling from Edmans, Goldstein and Jiang (2011) along with a cross term based on this variable and the given constraint index. Please see Section II for a full discussion of variable definitions. ***, **, * denote significance at the 1%, 5%, 10% levels, respectively. We also report the results of four regression diagnostic tests, as also summarized in Table VIII.

Variable Name	Dependent Variable= Equity Issuance	Dependent Variable= Debt Issuance
	Panel A: Constraint Index = Delay Investment Score	
Mutual Fund Selling	–0.0014***	0.0000
Mutual Selling x Index	0.0010	–0.0023
Regression Diagnostics	a, d	d
	Panel B: Constraint Index = Marginal Equity Focus Delay	
Mutual Fund Selling	–0.0016***	–0.0002
Mutual Selling x Index	–0.0083**	–0.0048
Regression Diagnostics	a, b, d	b, d
	Panel C: Constraint Index = Marginal Debt Focus Delay	
Mutual Fund Selling	–0.0014***	0.0000
Mutual Selling x Index	0.0023	–0.0004
Regression Diagnostics	a, d	d
	Panel D: Constraint Index = Marginal Private Placement Focus Delay	
Mutual Fund Selling	–0.0018***	–0.0001
Text Shock x Index	–0.1062***	0.0183
Regression Diagnostics	a, b, d	b, d
	Panel D: Constraint Index = KZ Index	
Mutual Fund Selling	–0.0013***	–0.0003
Mutual Selling x Index	0.0013	–0.0026*
Regression Diagnostics	a, d	d
	Panel E: Constraint Index = WW Index	
Mutual Fund Selling	–0.0004	0.0006
Mutual Selling x Index	0.0034	0.0028
Regression Diagnostics	a, b, d	b, d

Figure 1: Frequency distribution of text-based constraint measures.