

Capital Structure Choice: Macroeconomic Conditions and Financial Constraints

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August 27, 2001

Working Paper #279

An electronic version of the paper is available at:
<http://www.kellogg.nwu.edu/faculty/korajczyk/htm/wp279.pdf>

*We thank Susan Chaplinsky, Matthew Clayton, Kent Daniel, Chris Hennessy, Laurie Hodrick, Ravi Jagannathan, Deborah Lucas, Mitchell Petersen, Todd Pulvino and Anna Scherbina for helpful comments. We would also like to thank seminar participants at the Columbia/New York University joint seminar, New York University Macro Lunch, U.C. Berkeley and the Federal Reserve Bank of San Francisco. Robert A. Korajczyk, Kellogg Graduate School of Management, Northwestern University, 2001 Sheridan Road, Evanston, IL 60208-2001, r-korajczyk@northwestern.edu. Amnon Levy, Haas School of Business, U.C. Berkeley, 545 Student Services Building #1900, Berkeley, CA 94720-1900, levy@haas.berkeley.edu. Please send comments to levy@haas.berkeley.edu.

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Abstract

This paper provides new evidence of how macroeconomic conditions affect capital structure choice. We model firms' target capital structures as a function of macroeconomic conditions and firm-specific variables. We split our sample based on a measure of financial constraints. We find that target leverage is counter-cyclical for the relatively unconstrained sample, but pro-cyclical for the relatively constrained sample. The choice of what type of security to issue/repurchase is significantly related to deviations from the target capital structure, particularly for the constrained sample. Macroeconomic conditions are significant for issue choice for unconstrained firms but less so for constrained firms. Our results support the hypothesis that unconstrained firms are able to time their issue choice to periods when macroeconomic conditions are favorable, while constrained firms take what they can get.

JEL Classification: G32, G1

Keywords: Capital Structure; Business Cycles; Financial Constraints

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1 Introduction

Capital structure choice varies over time. For example, aggregate equity issues vary pro-cyclically and aggregate debt issues vary counter-cyclically for firms that access public financial markets. Meanwhile, firms that exhibit higher degrees of financial constraints do not exhibit these pronounced counter-cyclical debt issue patterns.¹ Additionally, firms are more likely to issue equity following an abnormal increase in their own price of equity.² Such observations suggest that both macroeconomic conditions and firm-specific factors drive variations in financing choices and these variations differ with the degree of financial market access. In this paper we quantify the relative importance of these factors by performing a variance decomposition for the time variation in financing choices on a sample of firms that is split on a measure of financial constraints.

We investigate the role of macroeconomic conditions and financial constraints in determining capital structure choice since these may induce time-series and cross-sectional heterogeneity in firm behavior. Firms that face financial constraints may not choose capital structure in the same manner as unconstrained firms.³ Similarly, time variation in macroeconomic conditions, such as changes in the relative pricing of asset classes, may lead a given firm to choose different capital structures at different points in time, other things equal. This allows us to investigate alternative capital structure theories in light of the effects of financial constraints and

¹Specifically, Choe, Masulis, and Nanda (1993) document that aggregate seasoned primary equity issues are pro-cyclical and debt issues are counter-cyclical. Korajczyk, Lucas, and McDonald (1990) document that aggregate equity issues are positively related with equity market performance. Gertler and Gilchrist (1993) document that aggregate net debt issues (public and private) increases for large firms but remains flat for small firms following recessions associated with a monetary contraction. Gertler and Gilchrist (1994) document that aggregate net short-term debt is more stable over the business cycle for small firms.

²See Korajczyk, Lucas, and McDonald (1990) for example.

³None of the firms in our sample are completely shut out of financial markets since they are firms that choose to access public capital markets over the sample period. We use the terms constrained and unconstrained to denote a relative relation.

macroeconomic conditions. Two important theories of capital structure are the tradeoff theory and the pecking order theory. In the tradeoff theory the benefits of increased leverage (for example, tax benefits or reductions in agency costs) are weighed against the costs of increased leverage (for example, deadweight bankruptcy costs) in order to determine the optimal amount of leverage. In the pecking order theory, external financing is expensive and more so for riskier securities (possibly due to informational asymmetries between managers and security holders). Thus, firms prefer financing with internal funds, then with debt, and lastly with equity.

Our approach is similar to Hovakimian, Opler, and Titman (2001), who look at the relation between firm-specific variables, target leverage, and issue choice. However, we split our sample based on a measure of financial constraints, theoretically defined as the set of firms that do not have sufficient cash to undertake investment opportunities and face severe agency costs when accessing financial markets (we use retention rates and investment opportunities as proxies). Moreover, we estimate the relation between firms' debt ratio and (i) firm-specific variables and (ii) macroeconomic conditions. We use the fitted values of this relation to estimate firms' target capital structures. We then investigate the relation between security issuances, the deviation from target leverage, and both firm-specific and macroeconomic variables.

Our results for the relation between firm-specific variables and target leverage are consistent with elements of both pecking order and tradeoff theories of capital structure and are inconsistent with some elements of each theory. Larger firms and those with more tangible assets tend to have higher leverage. Firms with unique assets tend to have lower leverage. Consistent with the tradeoff theory, firms with large depreciation tax-shields have lower target leverage. Also consistent with the tradeoff theory is the fact that deviations from our estimated target leverage explain firms' choice of security issuance. However, the negative relation between operating income and leverage and the relation between the macroeconomic variables and leverage seem consistent with a pecking order theory, particularly for unconstrained firms.⁴ Figure 1 illustrates the systematic peaks in corporate

⁴If operating income is proxying for growth opportunities, the tradeoff theory would predict a negative relationship between operating income and leverage.

leverage ratios that occur during economic downturns over the last fifty years. A tradeoff model would imply pro-cyclical leverage since during expansions (when the equity market is performing well, expected bankruptcy costs are lower, firms are more likely to have taxable income to shield, and firms have more free cash) debt should be more attractive for unconstrained firms (see Jensen and Meckling (1976), Gertler and Hubbard (1993), or Zwiebel (1996)).⁵ Moreover, since these firms seem to be far from bankruptcy, asset substitution (Jensen (1986)) or debt overhang (Myers (1977)) are unlikely to be driving the observed patterns. A pecking order model would be consistent with these patterns since firms prefer using internally generated funds to finance investment and have more internal funds during expansions.

The fact that our results with firm-specific variables are consistent with elements of both tradeoff and pecking order theories is consistent with previous empirical work that studies cross-sectional target leverage ratios (see, for example, Titman and Wessels (1988), Fama and French (2000), and Hovakimian, Opler, and Titman (2001)). Our results indicate that, after correcting for firm-specific variables, the macroeconomic variables help explain some of the counter-cyclical leverage patterns for the unconstrained sample. These patterns are consistent with some recent theoretical work that relates capital structure with macroeconomic conditions. Levy (2001) develops a general equilibrium model where firms that are not severely constrained have counter-cyclical leverage. In his model debt aligns risk averse managers' interests, which include private benefit extraction, with those of the outside shareholders. In recessions, levered managers receive less of the wealth, households receive relatively more of the wealth, and the agency problem exacerbates. Managers increase leverage as the required return on debt is sufficiently low so that the demand for securities by household equals the supply of securities by managers.

Additionally, the results add to the credit channel literature that analyzes the relation between debt issues, financial constraints, monetary policy, credit conditions, and the business cycle.

⁵Pulvino (1998) provides evidence that firm health and market performance influence bankruptcy costs for the airline industry. Titman and Wessels (1988) relate expected bankruptcy costs (using asset specificity as a metric) to capital structure. Mackie-Mason (1990) and Graham (1996) both provide evidence that tax shields impact capital structure choice.

The literature generally agrees that firms that face greater financial constraints, using size or the degree of bank dependence as proxies, find it difficult to borrow and smooth cash flows following negative shocks to the economy. Gertler and Gilchrist (1993) find that aggregate net debt issues, following recessions associated with a monetary contraction, increase for large firms but remain stable for small firms that rely on private debt. Similarly, Gertler and Gilchrist (1994) document that aggregate net short-term debt issues are less sensitive to the business cycle for small firms. Theoretically, the literature has debated whether these patterns are due to the effect of monetary policy on firms' debt issue patterns through the bank lending channel or through the balance sheet channel. The bank lending channel focuses on the possible effects of monetary policy actions on the supply of loans by depository institutions (see Kashyap, Stein, and Wilcox (1993) for example). The balance sheet channel stresses the potential impact of an economic slowdown on borrowers' balance sheets.⁶ For example, Kiyotaki and Moore (1997) and Suarez and Sussman (1999) develop general equilibrium models where constrained firms (farmers in the Kiyotaki and Moore model) are always up against their borrowing constraints. The pro-cyclical price of collateral, against which they borrow, results in pro-cyclical leverage. Our results find support for this effect, with our constrained sample exhibiting pro-cyclical leverage.

As demonstrated in Fischer, Heinkel, and Zechner (1989) or Leland (1994, 1998), frictions will result in a firm deviating from its target leverage. Therefore, in a second stage we estimate how firms' security issue choices (debt versus equity) vary with (i) the distance between actual and target leverage, (ii) macroeconomic conditions, and (iii) firm-specific variables. Macro and firm-specific variables are included in this second stage to account for variations in the costs of issuing or repurchasing debt or equity due to adverse selection for example. These variables are also included to account for variations in the marginal costs and benefits of debt and equity financing that have been shown to perform well in describing issue choice. For example Mackie-Mason (1990) provides evidence that marginal tax shields can help describe issue choice.

⁶For a more complete description of the debate as well as a review of the literature see Bernanke and Gertler (1995).

Although we find that security issue and repurchase choice is sensitive to deviations from the target for both samples, it is particularly sensitive for the constrained sample. The unconstrained sample's issue choice is substantially more sensitive to variations in macroeconomic conditions than the constrained sample, consistent with arguments that unconstrained firms can deviate from their target capital structure in order to time their issues to periods where market conditions are most favorable; i.e. periods where the relative pricing of the security issued is favorable. We find similar results when investigating the repurchase choice for our unconstrained sample. As with the target regressions, our firm-specific results are consistent with previous studies.

Our issue choice results are consistent with several empirical and theoretical papers that study how aggregate security issues vary across time. These studies have, in general, focused on either aggregated series or equity issues alone, and have not explicitly tested for the role of macroeconomic conditions in financing choices.⁷ This literature has focused on settings similar to the Myers and Majluf (1984) pecking order theory, where insiders know more about the prospects of their firms than outsiders. Managers, who have current equity owners interests in mind, avoid issuing equity when they believe their shares are underpriced. Therefore, equity issues convey unfavorable news about the firm's prospects. Consistent with this theory, there is a substantial negative price reaction to equity issue announcements [Masulis and Korwar (1986)] that are less negative following credible releases of information [Korajczyk, Lucas, and McDonald (1991)].⁸ Moreover, debt financing is found to have a less negative issue announcement effect, which is consistent with its value having a lower sensitivity to information asymmetries [Chaplinsky and

⁷Exceptions are Marsh (1982), who includes a forecast of aggregate debt and equity issues as a measure of "market conditions" in estimating issue choice, and Bayless and Chaplinsky (1991), who include a measure of equity market performance and the change in the T-bill in estimating issue choices.

⁸Jensen (1986) argues that a free cash story where managers can indulge themselves when they are not forced to make interest payments can explain these empirical observations. However, the fact that the average price reaction is the same for pure secondary issues [Korajczyk, Lucas, and McDonald (1990)] is not consistent the free cash flow story being the sole cause of the price decline.

Hansen (1993)].

Lucas and McDonald (1990) extend Myers and Majluf's theory to a dynamic setting where managers, with private information about their company's value, cannot issue debt and delay equity issues until their stock price rises to or above its true value. Since market prices are correlated across firms, equity issues cluster around market peaks. Korajczyk, Lucas, and McDonald (1990) provide evidence of this effect by documenting that equity issues cluster following a run-up in the equity market.

Choe, Masulis, and Nanda (1993) argue that adverse selection costs vary counter-cyclically to explain the general increase in equity issues during expansions. A model with endogenous counter-cyclical adverse selection is derived in Eisfeldt (2001). Bayless and Chaplinsky (1996) argue that "windows of opportunity" in which capital can be raised at favorable terms result in observed periods of extreme equity issue volume (or "hot" equity markets) as firms time their equity issues.⁹ Empirically, price reactions to equity issue announcements are less negative during these periods.

Although these descriptions of macroeconomic episodes in which equity issues cluster are useful starting points, they are not completely consistent with the data. For example, during the second expansion of the 1970s, the equity market performed poorly, the average price drop upon an equity issue announcement was relatively large, yet equity issues as a fraction of total outside funding was relatively high.¹⁰ Our results suggest this pattern may be due to counter-cyclical target

⁹Two interpretations of a "window of opportunity" include (i) a behavioral argument where the market is particularly exuberant over equity issues, and (ii) the relative pricing, due to the severity of adverse selection for example, of asset classes (i.e. debt and equity) is such that a large number of firms prefer to issue equity.

¹⁰In fact, Bayless and Chaplinsky (1996) classify the period between 1976 and 1979 as a cold market. The average price reaction to an equity issue announcement was -3.6% during this period, compared with -2.0% during their classified "normal" markets. Meanwhile, Choe, Masulis, and Nanda (1993) document that the dollar amount of equity issues as a fraction of the sum of equity and straight debt issues for companies listed in on the NYSE, AMEX and NASDAQ was 40% between April 1975 and January 1980 compared with 18% for their entire sample period between January 1971 and December 1991. They also document that between

leverage combined with the unusually high leverage observed for that period (see Figure 1).

The rest of this paper is organized as follows. In Section 2, we discuss the data set and empirical specification. In Section 3 we describe our estimation results. Section 4 provides checks for robustness. Section 5 concludes with direction for future research.

2 Data and empirical specification

All series are converted to real values in 1980 dollars using the CPI inflation series [Ibbotson Associates (2001)]. Similar to the procedures used in Hovakimian, Opler, and Titman (2001), the determinants of financial choices are examined when firms make significant changes to their capital structure; in order to be included in our sample, a firm must have the net value of equity (common and preferred) issued or repurchased, the amount of dividends paid, or the change in the book value of debt (straight and convertible) of at least 5% (7% for dividends) of the book value of assets in the previous quarter.^{11,12} We are hoping to capture firms that are not completely constrained from accessing financial markets and have considered the various trade-offs of issuing or repurchasing one security over another.

Quarterly Primary/Secondary/Tertiary, Full Coverage, and Research COMPUSTAT and monthly CRSP data from 1984:1 to 1999:3 are used. To filter out firms with little publicly observable history and unstable financial or operating status, we require the firm to have reported COMPUSTAT data items for eight quarters before and eight quarters after the event of changing

January 1971 and November 1973 the ratio was 35%, despite poor performance in the equity market. Unfortunately we do not have readily available data regarding price reactions prior to 1974.

¹¹A 7% cutoff is used for dividends to correct for the overall average dividend to asset ratio of 2%.

¹²Since the value of preferred stock is rarely reported and convertible debt is never reported at the quarterly frequency, net common equity issues and repurchases cannot be disentangled from preferred equity, and convertible debt cannot be disentangled from straight debt. Hovakimian, Opler, and Titman (2001) are able to disentangle such issues by using the annual COMPUSTAT files.

their capital structure.¹³ Moreover, to estimate abnormal returns in standard fashion (see Campbell, Lo and MacKinlay p.184 for example) 60 months of CRSP data prior to the change in capital structure are required. Utilities and financial firms are precluded. In total, our sample contains 4,913 event quarters with significant capital structure changes. As depicted in Figure 2, we use data from a nine quarter window around each event.

2-1 Financial constraints

Motivated by evidence from the credit channel literature that firms with differential access to financial markets have different debt issue patterns, we split our sample into two categories that we will refer to as financially constrained and financially unconstrained. We define a firm financially constrained if it does not have sufficient cash to undertake investment opportunities, and faces severe agency costs when accessing financial markets. We use a high retention rate combined with the existence of investment opportunities to identify financially constrained firms. Dividends/security repurchases and investment compete for funds. Firms that have investment opportunities and face relatively high costs of external finance should choose to retain net income for investment. Therefore, the specific criteria for a firm-event window to be labeled financially constrained are: (1) the firm does not have a net repurchase of debt or equity and does not pay dividends within the event window (2) the firm's Tobin's Q, defined as the sum of the market value of equity and the book value of debt, divided by the book value of assets, at the end of the event

¹³Following Hovakimian, Opler, and Titman (2001), firms-quarters with outlying firm-specific values (those with the highest 0.5% and, for some variables, lowest 0.5% of values) are replaced with missing values to minimize the influence of extreme values on the analysis. Moreover, since selling, general and administrative expenses, and book assets are used as normalizing variables, they are required to be positive. Outliers were replaced when the market-to-book ratio was greater than 36.95 or less than 0.31; when the average operating income/assets over the previous four quarters were greater than 0.65 and less than -0.10; when the average selling expense/sales over the previous four quarters was greater than 1.00 and less than 0.019; when accounts receivables/assets were greater than 0.73; when the average depreciation/assets over the previous four quarters were greater than 0.039; when the average income taxes/assets over the previous four quarters were greater than -0.04 and less than -0.015; and when one year excess stock returns were greater than 402% and less than -109%.

quarter be greater than one. A firm-event window is labeled as financially unconstrained if it is not labeled constrained. Our methodology is similar to Fazzari, Hubbard, and Petersen (1988) who use the level of dividend distributions to categorize firms into groups facing differing levels of financial constraints.¹⁴ However, we also condition on Tobin's Q to ensure that firms in our constrained sample have investment opportunities and are not financially distressed. In total we classify 492 firm event windows as financially constrained and 4,421 as financially unconstrained.¹⁵

Several summary statistics for nine quarter event-windows in each class, presented in Table 1, suggest that we are in fact proxying for financial constraints. Corresponding with others who measure financial constraints (for example Fazzari, Hubbard, and Petersen (1988)), our constrained firms are smaller on average. Since one of the requirements was to have a market-to-book ratio greater than one after an issue, it is no surprise that our constrained sample has a substantially higher overall average. It is interesting that the constrained sample has substantially higher capital expenditures (as a fraction of assets), despite having lower average income and approximately the same median income, suggesting that we are in fact capturing firms with investment opportunities. The constrained sample has a lower debt ratio when measured using market values, but approximately the same average leverage ratio when measured using book values. This is not surprising since book values proxy for tangible assets that can be used more easily as collateral and given that our sample is stratified on Q. The constrained sample has a higher beta, suggesting that the relative movement in equity values is not driving the difference in leverage patterns across the

¹⁴A number of alternative definitions of financial constraints have been proposed. For our sample, firms in the most constrained decile, according to the augmented Kaplan and Zingales (1997) measure used in Lamont, Polk and Saá-Requejo (2001), were approximately fifteen percent more likely to make a major security repurchase, using our definition, as the firms classified as less constrained. Kashyap, Lamont and Stein (1994) use the existence of a bond rating to categorize unconstrained versus constrained firms. This classification algorithm would lead to a much larger fraction of our sample being categorized as constrained since only approximately 20% of the sample has a bond rating.

¹⁵Only 9 of the financially constrained firm event windows had investment grade bonds rated by S&P; 5 had a rating of BBB, 4 had a rating of AA and the rest has speculative grade debt or no rating at all.

two samples.¹⁶ Finally, motivated by papers such as Fazzari, Hubbard and Petersen (1988), the second row from the bottom relates the sensitivity of investment to cash flow; in the absence of frictions, cash flows should not influence investment decisions. Consistent with their findings, investment for our constrained sample is sensitive to variations in cash flows.¹⁷ Meanwhile, investment for our unconstrained sample is not sensitive to variations in cash flows.¹⁸

2-2 Empirical specification

We use both firm-specific data and aggregated/macroeconomic data to isolate macroeconomic conditions in firms' financing choices.¹⁹ Similar to Marsh (1982), Bayless and Chaplinsky (1991) and Hovakimian, Opler, and Titman (2001), we assume firms' capital structure choices can be described by the following two equations,

$$(1) \quad Lev_{i,t}^* = MacroT_{i-3}\alpha + X_{i,t-3}\beta + f_i + q_t + fq_t + d86$$

$$(2) \quad \Pr(y_{it} = 1) = F(\delta(Lev_{it}^* - Lev_{it-3}) + MacroI_{it-3} \eta + Z_{it-3} \gamma + q_t + fq_t + d86) .$$

The first equation describes a firm's expected optimal leverage ratio in month t (Lev_{it}^*) as a function

¹⁶Beta is measured using five years of data prior to the issue, repurchase or dividend.

¹⁷In this exercise we regress investment (capital expenditures less depreciation divided by property plant and equipment) on cash flow (net income plus depreciation), lagged Tobin's Q, and lagged cash as a fraction of assets. Only the cash flow coefficients and (standard errors) are presented, along with a test of coefficient equality.

¹⁸Our results are consistent with both sides of the debate regarding the relation between financial constraints and investment-cash flow sensitivity (see Kaplan and Zingales (2000) or Fazzari, Hubbard, and Petersen (2000)); cash flows should not influence investment for unconstrained firms. Our data requirement of financial markets access reinforces the notion that our sample is unconstrained in the sense that our firms have paid any fixed costs associated with financial market access. Meanwhile, our results suggest that the constrained sample is not accessing as much capital as they would like.

¹⁹The procedure is similar to Gertler and Hubbard (1993), who estimate macroeconomic determinants of dividend payments.

of known firm-specific target variables (X_{it-3}); known macroeconomic target variables ($MacroT_{it-3}$); a fixed effect (f_i); a calendar quarter dummy (q_t); a financial quarter dummy (fq_t); a 1986 tax reform dummy that equals one for years prior to 1987 ($d86$). Lev^*_{it} is a firm's expected optimal leverage ratio in the absence of the information asymmetries or transaction costs discussed in the introduction. The second equation describes a firm's expected issue (repurchase) choice ($y_{it} = 1$ for debt and 0 for equity) as a function of the distance the existing capital structure is from the expected target ($Lev^*_{it} - Lev_{it-3}$); known firm-specific issue variables (Z_{it-3}); known macroeconomic issue variables ($MacroI_{it-3}$); and a calendar quarter, a financial quarter, and a 1986 tax dummy. Firm-specific and macroeconomic conditioning variables are discussed at length below.

2-3 Target variables

2-3-1 Firm-specific target variables

The choice of firm-specific target variables, X_{it-3} , is meant to capture the nature (tangible vs. intangible) of the firms' assets, profitability, the existence of alternative tax shields, and size. Since firm-specific variables are not the primary focus of the paper, we do not include summary statistics for these variables. Unless specified, these variables are measured as a fraction of book assets. Net property plant and equipment is included as a measure of collateral [Titman and Wessels (1988)]. The mean tax payment and depreciation over the previous four quarters are included to proxy for potential tax shields and tax losses carried forward.²⁰ Following Titman and Wessels (1988), the mean selling expense as a fraction of sales over the previous four quarters are included as a proxy for uniqueness.²¹ The mean operating income over the previous four quarters and the firm's

²⁰COMPUSTAT does not report tax losses carried forward at the quarterly frequency. However, Hovakimian, Opler, and Titman (2001) find that net operating loss carryforwards are highly positively correlated with operating profits.

²¹Measures of uniqueness proxy for costs associated with liquidating specialized assets. As a firm becomes more unique, it is more difficult and costly to liquidate its assets in the event of bankruptcy.

market-to-book ratio are included as measures of long-term performance and growth opportunities [Titman and Wessels (1988)].²² In addition, we correct for firm size as do Fama and French (2000) and Hovakimian, Opler, and Titman (2001). They argue that cash flows of larger more diversified firms are less volatile, increasing the probability that interest tax shield will be realized and reducing expected bankruptcy losses. To correct for size in a stationary fashion, we include the ratio of the firm's assets-to-the mean assets of firms within each four digit SIC group that quarter. We also include a dummy variable that equals one if the firm has assets that are larger than or equal to the smallest firm that has a debt rating that quarter. Firm fixed effects are included in most regressions to correct for idiosyncratic factors that influence capital structure.

2-3-2 Macro target variables

In Kiyotaki and Moore (1997) and Levy (2001) the aggregate distribution of wealth between managers and households (farmers and gatherers in Kiyotaki and Moore (1997)) determines the degree of agency problems and optimal leverage. Using the fact that manager compensation is tied to corporate profits (due to bonuses) and equity performance (due to equity and option compensation), we construct three series which are included in $MacroT_{it-3}$ to proxy for this distribution effect. The 2-year aggregate domestic nonfinancial corporate profit growth is computed using quarterly data from the Flow of Funds and is matched with the firm quarter with the most overlap. The 2-year equity market return is computed from the CRSP value weighted index of stocks traded on NYSE, AMEX and NASDAQ. The commercial paper spread over the Treasury bill is used as a forward looking measure of corporate profits and therefore a forward looking measure of managerial compensation. The commercial paper spread is frequently argued to proxy for the market's expectation of commercial paper issuances as firms smooth shocks to cash flows, and is documented to widen

²²A fifth order polynomial of market-to-book was included since its relation with leverage was found to be highly nonlinear. The order was chosen to minimize Akaike's information criterion for the constrained regression when leverage was measured with market values and is used in all first stage regressions for comparability.

dramatically prior to an economic slowdown (frequently following a Federal Reserve monetary contraction).²³

Unconditional sample correlations of leverage measures and the target-macroeconomic variables, lagged one quarter, are presented in Table 2. Consistent with findings in the credit channel literature, unconditional debt ratios are generally more counter-cyclical for our unconstrained sample. In fact, for our constrained sample unconditional debt ratios have a pro-cyclical relationship with the 2-year equity market return when measuring assets with book values.

2-4 Issue and repurchase variables

2-4-1 Firm-specific issue and repurchase variables

As with our firm-specific target variables, the choice and results of firm-specific issue variables, Z_{it-3} , are similar to extant research. Hence, we do not include summary statistics. Z_{it-3} represents a vector of firm-specific variables that, unless specified, are measured as a fraction of book assets. Ambarish, John and Williams (1987) generalize Myers and Majluf (1984) to show that the stock price response to new financing depends on the relative asymmetric information of assets in place versus growth opportunities. Empirical support is found by Pilotte (1992). We include proxies for growth opportunities in Z_{it-3} : the mean of capital expenditures over the four quarters prior to the event, the mean of selling expenses as a fraction of sales over the four quarters prior to the event and Tobin's Q.²⁴ We also include proxies for net operating loss carry forwards in Z_{it-3} : mean operating

²³Bernanke and Blinder (1992) observe that the commercial paper spread over Treasury bills tend to rise most sharply during Fed-induced "credit-crunches." Friedman and Kuttner (1993) provide a discussion of why the commercial paper spread performs well in predicting economic activity. It is worth noting that we found that the commercial paper spread performs best in predicting leverage patterns when compared to other variables that are frequently used in predicting economic activity such as the term spread and the Federal Funds Rate.

²⁴ Pilotte (1992) shows that $\frac{R\&D}{Sales}$ is positively related to a firm's 2-day equity announcement period abnormal return; when $\frac{R\&D}{Sales}$ is high the negative announcement effect is smaller. We use

income, mean tax payments, and mean depreciation over the four quarters prior to the event (see footnote 19). As above, we correct for size in a stationary manner by including the ratio of the firm's assets-to-the mean assets of firms within each four digit SIC group that quarter as well as a dummy that equals one if the firm has assets that are larger than or equal to the smallest firm that has a debt rating that quarter. The one year abnormal return, using a market model with 60 months of data prior to the issue, is included to correct for the observed equity price run-up prior to equity issue announcement (see Korajczyk, Lucas, and McDonald (1990) and Graham and Harvey (2001)). The dollar value of the issue (or repurchase) is included to correct for potential interactions between the issue size and price reaction and the fact that slightly under-levered firms might issue equity when they issue a large amount of only one security. Following Hovakimian, Opler, and Titman (2001), who argue that managers' issue choice is influenced by reported accounting numbers, we include a dilution dummy that equals one if an equity issue dilutes the firm's earnings per share more than a debt issue (also see Graham and Harvey (2001)) as well as a market-to-book ratio dummy that equals one if an equity issue will dilute the firm's book value per share.²⁵

2-4-2 Macro issue and repurchase variables

Following the arguments in Bayless and Chaplinsky (1996) and Choe, Masulis, and Nanda (1993) that firms issue equity when the price reaction to an equity issue announcement is less negative, we construct a three-month moving average of two-day cumulative abnormal prediction

selling expense rather than R&D since selling expense includes R&D and is more consistently reported at a quarterly frequency. We get similar results when we use $\frac{R\&D}{Sales}$ on the sub-sample of reporting firms.

²⁵The firm's earnings-price ratio is defined as $E/P = (EBIT - Debt \times r_d)(1 - T_c) / \text{market value of equity}$. Issuing equity dilutes the earnings-price ratio more than issuing debt if the first derivative of E/P with respect to issuing equity is more negative than the first derivative with respect to debt, which reduces to the condition that $E/P > r_d(1 - T_c)$, (Hovakimian, Opler, and Titman (2001, fn. 19)). We use the yield on Moody's Baa rated debt as r_d and T_c is set equal to 50% prior to 1987 and 34% afterwards.

error (CAPE) to seasoned equity issue announcements using data from SDC and CRSP.²⁶ This is the first variable included in $MacroI_{it-3}$.

Motivated by arguments in Gertler and Hubbard (1993), where macroeconomic conditions are credible indicators of investment opportunities and allow firms to adjust their dividend policy, we use the commercial paper spread over Treasury bills and the term spread as credible signals of economic performance and expected growth opportunities (see Stock and Watson (1998) for a discussion of variables that predict economic activity).²⁷

Motivated by the theoretical arguments in Lucas and McDonald (1990) as well as empirical findings in Korajczyk, Lucas, and McDonald (1990) that equity issue clusters follow run-ups in the equity market, the 3-month CRSP value weighted equity market return is included in $MacroI_{it-3}$. We use the default spread, an average yield on Baa less Aaa Moody's rated bonds, as a measure of financial distress costs.

Table 3 presents sample mean and median values for issue choice macroeconomic variables, lagged one quarter, across the unconstrained and constrained firm-quarters that have either a net equity or debt issue of larger than 5% of book assets in the previous quarter, but not both. Tests of mean or distribution equality across debt and equity issuers suggest that unconstrained firms issue equity following a larger runup in the equity market, when the average price reaction to equity issue announcements is less negative, when the commercial paper spread is low and the term spread is high

²⁶Following Bayless and Chaplinsky (1996) CAPE are estimated for day 0 and day +1 using the market model. As in Bayless and Chaplinsky (1996) registration dates are used as announcement dates. To determine the effects of using registration dates, they collected announcement dates from NEXIS for 1989 and found a comparable CAPE based on announcement dates and registration dates. Returns are obtained from CRSP. Utilities and financial firms are excluded from the estimation.

²⁷Since the price reaction variable is the average of firms choosing to finance projects via equity, it will, in general, not be a sufficient statistic for the distribution of projects. For example, the observed distribution will always be truncated since firms with poor expected prospects will not issue equity; the price reaction would be severe and they would be priced out of the equity market. Variables that proxy for aggregate investment opportunities, such as the commercial paper spread and the term spread, can be used to describe the distribution of projects.

(when economic prospects are good). Although the bivariate analysis suggests the default spread (the cost of financial distress) is indistinguishable across unconstrained equity and debt issuers, the multivariate analysis, reported later, suggests that it is relevant. The results for the constrained sample are quite different, with the mean equity market return the only variable that is statistically different for constrained equity and debt issuers. Moreover, the difference in mean and median point estimates are frequently opposite those of the unconstrained sample.

Table 4 presents sample mean and median values for repurchase choice macroeconomic variables, lagged one quarter, across the unconstrained firm-quarters that have either a net equity or debt repurchase of larger than 5% of book assets in the previous quarter, but not both.²⁸ These bivariate results are much noisier. The commercial paper spread is the only variable that is statistically different across equity and debt repurchasers; equity repurchases occurring when the commercial paper spread is high.

3 Estimation

3-1 Estimating target leverage

In estimating the target leverage, we assume the firm's actual leverage ratio (Lev_{it}) is equal to its target (Lev_{it}^*) plus measurement error that is orthogonal to the explanatory variables. This implies that we can estimate coefficients and standard errors from Equation (1) using the following specification:

$$(3) \quad Lev_{it} = MacroT_{it-3}\alpha + X_{it-3}\beta + f_i + q_t + fq_t + d86 + \varepsilon_{it}.$$

When estimating the target, four different measures of debt to assets are used. In all cases debt

²⁸Since open market repurchases take several months (and sometimes several years) to complete, we are probably picking up tender offers in our definition of share repurchases (see Fried (2001) for a discussion). Although the ratio of equity to debt repurchases will be biased down, it is not clear that the coefficients on the explanatory macro- or firm-specific variables will be biased.

is measured using book values. The first measure of leverage is the ratio of short-term plus long-term debt to market value of assets, measured as the sum of the market value of common equity and book value of debt. In the second, we use the ratio of long-term debt to market value of assets. In the third, we use the ratio of short-term plus long-term debt less cash and marketable securities to market value of assets less cash and marketable securities. In the fourth we use the ratio of short-term plus long-term debt to book value of assets.

Regression coefficients, standard errors, and the time series variance decomposition results can be found in Tables 5a (the unconstrained sample) and 5b (the constrained sample) for a variety of specifications. Our results regarding firm-specific variables are similar to those found in previous studies (e.g., Fama and French (2000) and Hovakimian, Opler, and Titman (2001)). Target leverage is negatively related to firm profitability, the extent of non-interest tax shields, the level of taxes paid, the level of intangible versus tangible assets, and the market to book ratio. Target leverage is positively related to firm size. Some of the results are consistent with tradeoff theories (e.g., the negative relation between target leverage and non-interest tax shields). Some are consistent with pecking order theories (e.g., the negative relation between target leverage and profitability). Finally, some of the results seem to indicate that variables are proxies for deviations from target (e.g., the positive relation between target leverage and net operating loss carryforwards in Hovakimian, Opler, and Titman (2001) and the negative relation we find between target leverage and taxes paid). The second-stage issue choice coefficients on loss carryforwards and taxes paid are consistent with this interpretation since carryforwards decrease and taxes paid increase the probability of issuing debt rather than equity. Because of the similarity to the extant literature, we only report the coefficients on the macroeconomic variables. Standard errors are robust to heteroskedasticity and are clustered at the overlapping event-level, which assumes only error independence across non-overlapping events.²⁹ In computing the time series variance decomposition, we construct $Macro_t = \sum_{i=1}^1 MacroT_{it}$.

²⁹Prior to each event, the residuals may have a particular autocorrelation structure for each event window since; the actual leverage ratio may have a tendency to be either above or below it's target. By not assuming error independence within overlapping events, we ensure this effect is not biasing our standard errors. For a discussion of how the standard errors are computed see

$\hat{\alpha}$ and $Firm_t = \sum_{i=1}^I X_{it-3} \hat{\beta}$. We then define the variance decomposition as:³⁰

$$Macro\ Variance = \frac{Variance[Macro_t]}{Variance[Macro_t + Firm_t]},$$

$$Firm\ Variance = \frac{Variance[Firm_t]}{Variance[Macro_t + Firm_t]},$$

$$Covariance = \frac{Covariance[Firm_t, Macro_t]}{Variance[Macro_t + Firm_t]}.$$

Following Campbell (1991) we calculate the asymptotic standard errors for the variance decomposition using the delta method. We treat the regression coefficients and the covariance matrix of $Firm_t$ and $Macro_t$ as parameters to be jointly estimated using the Generalized Method of Moments of Hansen (1982).

Looking at the coefficients for the macro variables, the unconstrained sample has both statistically and economically significant counter-cyclical coefficients (Table 5a) but the constrained sample has, in general, pro-cyclical coefficients that are statistically different from the unconstrained sample (see Table 5b). This corresponds with predictions in Kiyotaki and Moore (1997), Suarez and Sussman (1999), and Levy (2001).³¹

Rogers (1993).

³⁰Notice that firm (or SIC) fixed effects are included in the regressions, but are not included in the variance decomposition. Therefore, the variance decomposition does not incorporate variations due to firms with different average leverage entering and exiting the sample as they access financial markets; $Firm_t$ only includes deviations from a firm's average (industry) leverage.

³¹Kiyotaki and Moore (1997) predict that pro-cyclical collateral values result in pro-cyclical leverage patterns for constrained firms. This suggests a positive relation between leverage and the product of collateral measures, such as property plant and equipment, and our measures of macroeconomic conditions. When we included such product terms, we indeed found a positive but statistically insignificant relationship. We suspect the lack of significance stems from the fact that as collateral increases firms tend to be less constrained, resulting in a noisy experiment.

The variance decomposition results are given in the last three rows of Tables 5a and 5b. They show that macroeconomic conditions account for a substantial proportion of the time variation in target leverage, particularly for the unconstrained sample. The firm-specific variables also account for a substantial proportion of target leverage variation. The proportion of variance attributable to the firm-specific variables is significantly larger for the constrained sample when we use market-value leverage ratios. As expected, target leverage variations due to macro and firm-specific variables co-vary positively for the unconstrained sample; during expansions firms have positive earnings and tend to have lower leverage (see Titman and Wessels (1988) for example). The exception is when assets are measured with book values where the negative co-variation is driven by the unusual increase in leverage during the 1980s (also see Section 4-4 and Bernanke and Campbell (1988)).³² The covariance component is small for the constrained firms.

3-2 Estimating the debt-equity issue choice

In this section we describe results from estimating the specification described in Equation (2) for firms that have a net equity or debt issue of at least 5% of their book assets.³³ Throughout the analysis we consider two separate measures of debt: long-term debt as well as the sum of short and long-term debt. Table 6 presents coefficients and standard errors, that are robust to heteroskedasticity using the Huber/White/sandwich estimator, from estimating the change in the probability of issuing debt versus equity for a change in independent variables using a probit specification.³⁴ Additionally,

³²The signs of the target leverage coefficients generally are the same regardless of whether asset are measured in market values or book values. The major exception is for the market to book ratio. Fama and French (2000) provide an extensive analysis of book versus market debt ratios.

³³Hovakimian, Opler, and Titman (2001) use a similar method to classify issues and find that they obtain similar results using issue data from the SDC. However, they did find instances of misclassification of equity issues due to debt conversion or a transfer of an equity account from a subsidiary to a parent. They found similar misclassification of debt issues.

³⁴Standard errors that were estimated using a bootstrap technique to account for the estimation of the leverage deficit and instrumented price reaction (see the note in Table 6) were

OLS estimates are presented and used to construct the variance decomposition, which requires a linear relationship between the fitted values and the independent variables.

Higher firm profitability and the level of taxes paid increase the probability of issuing debt even though the coefficients on these variables in the target leverage regression are negative. The change in sign on profitability between the leverage and issue choice regressions is consistent with a short-run pecking order model (internally generated profits are used rather than debt) and a long-run tradeoff model (when a profitable firm eventually accesses the public capital markets, it is more likely to issue debt) and is also found by Hovakimian, Opler, and Titman (2001). As discussed above, the switch in sign on taxes paid is similar to the switch in sign on loss carryforwards found by Hovakimian, Opler, and Titman (2001) and is consistent with these variables proxying for deviations from target leverage. As with the target regressions, since our results regarding firm-specific variables are similar to those found in previous studies we only report coefficients on macroeconomic variables.

Issue patterns for unconstrained and constrained firms are substantially different. The leverage deficit is the difference between the expected target leverage ratio at the end of the issue quarter (Lev^*_{it}) and the actual leverage ratio at the beginning of the issue quarter. The target is estimated from the fitted values of equation (3). As expected, the coefficients on the leverage deficit are positive and statistically significant for both classes of firms; a leverage deficit increases the probability of issuing debt.³⁵ This is consistent with results found in Hovakimian, Opler, and Titman (2001) who find that firms move more actively toward their target than suggested by Shyam-Sunder and Myers (1999) who argue that the pecking order theory provides a better empirical description of capital structures than theories arguing that firms target their leverage ratio. Notice that constrained firms are much more sensitive to deviations from their target. The difference is generally statistically significant, but not reported in the table for brevity. At the margin, a one standard deviation increase

virtually identical to the ones reported.

³⁵We use $\frac{ST+LT\ Debt}{Market\ Assets}$ as the measure of leverage when analyzing short-term or long-term debt issues and $\frac{LT\ Debt}{Market\ Assets}$ when analyzing only long-term debt issues.

from the average target deficit results in an increase in the probability of issuing debt rather than equity by 13% - 16% for unconstrained firms and 19% - 28% for the constrained firms. The standard deviation of the leverage deficit, measured using the sum of short and long-term debt, is 0.11 for unconstrained and 0.08 for constrained firms.

Looking at the unconstrained sample, all of the macroeconomic variables have the expected signs and, aside from the commercial paper spread, are generally statistically significant. Meanwhile, the only macroeconomic variables that are occasionally significant at predicting issue choice for the constrained sample are the return on the equity market and the default spread. The difference across the two samples is generally not statistically significant and not reported in the table for brevity. It is interesting that the significant variables for both samples become larger in magnitude when equity issues are compared to only long-term debt issues for both the constrained and unconstrained firms. This may be a result of short-term debt issues representing short-term financing needs as opposed to long-term capital structure decisions.

The variance decomposition is estimated in the same manner as in Section 3-1. The difference between the unconstrained and constrained sample is striking. As suggested by the coefficients, the unconstrained sample is much more sensitive to macroeconomic conditions while the constrained sample is much more sensitive to deviations from the “target.” Moreover, macroeconomic conditions are only marginally statistically significant for the constrained sample. Meanwhile, the variance attributed to time variation in firm-specific variables is substantial for both samples.

Similar to the macroeconomic variables, the one year abnormal return on the firm’s equity, the only firm-specific variable we report, is insignificant for the constrained sample. In general, the results support the hypothesis that our constrained sample does not time issues to periods when conditions are favorable as the unconstrained sample does. Moreover, since constrained firms are much more sensitive to deviations from their target, and deviate from their target by less (the target deviation has a smaller standard deviation), this timing “indifference” suggests that constrained firms take what they can get.

3-3 Estimating the debt-equity repurchase choice

Similar to Section 3-2, this section describes results from the second stage choice regressions for unconstrained firms that have a net equity (preferred and common) or debt repurchase of at least 5% of their book assets. Throughout the analysis we consider two separate measures of debt: long-term debt as well as the sum of short and long-term debt.³⁶ For a firm to be included in the sample, its relevant debt ratio must be at least 5% in the quarter previous to the repurchase. Table 7 presents coefficients and standard errors, that are robust to heteroskedasticity using the Huber/White/sandwich estimator, from estimating the change in the probability of issuing debt versus equity for a change in independent variables using a probit specification.³⁷ OLS estimates are also presented and used to construct the variance decomposition.

The leverage deficit coefficient has the predicted sign, and is statistically significant; a leverage deficit decreases the probability of repurchasing debt. Although the return on the equity market and the term spread are not statistically significant, the commercial paper spread, another measure of future macroeconomic performance, is very significant. The positive and significant coefficient on the price reaction variable suggests that the price reaction variable is a proxy for more than the simple “window of opportunity” in which equity capital can be raised at favorable terms [Bayless and Chaplinsky (1996)].³⁸ The positive and significant coefficient on the default spread,

³⁶Including large dividends along with equity repurchases made virtually no difference. Results are excluded for brevity.

³⁷Standard errors that were estimated using a bootstrap technique to account for the estimation of the leverage deficit and instrumented price reaction (see the note in Table 6) were virtually identical to the ones reported.

³⁸To ensure that the significance of the coefficient on the price reaction variable is not due to firms timing equity issue/debt repurchase recapitalizations, we estimated repurchase choice and excluded observations that have an equity issue and a debt repurchase in the same quarter (less than 10% of the repurchase sample had an equity issue and debt repurchase). We found that the coefficients on the price reaction variable were not economically or statistically different from the full sample. The results are excluded for brevity.

combined with results in Pulvino (1998) that financial distress costs are counter-cyclical, suggests that firms are efficiently repurchasing debt when expected deadweight bankruptcy costs are high.

In general, the effect of varying short-term macroeconomic variables on repurchases complement the results on issues in that there is a move toward debt financing (debt issues or equity repurchases) during economic downturns. That is, when the price reaction variable is more negative, following a low return on the equity market, when the term spread is high, and when the commercial paper spread is high. Moreover, as above, the target leverage deviation and the significant macroeconomic variables become more economically relevant when comparing equity issues to long-term debt issues. Finally, the variance decomposition results are similar to those found above.

4 Robustness checks

4-1 Product market competition

Several empirical and theoretical studies have suggested that capital structure affects competition in the product market. For example, Campello (2000) finds that a firm's leverage, relative to its industry rivals, will affect its incentives in the product market following aggregate demand shocks. These findings suggest that variables included on the right-hand side of the target leverage regression that proxy for profitability are endogenous. To ensure this potential spurious correlation is not driving the results in Tables 5a and 5b, we use the fact that capital structure can only interact with product market competition when firms have market power. Specifically, target leverage is estimated for a sub-sample of unconstrained firms in competitive industries.³⁹ Using the classification procedure of Rotemberg and Saloner (1986), we split our sample of manufacturing firms into more or less competitive industries on the bases of the two digit SIC four-firm concentration ratio. Industries with a concentration ratio of less than the median of 35.4 are labeled

³⁹We were not able to conduct the same exercise for the constrained sample due its small sample size.

as competitive, otherwise they are labeled as noncompetitive.⁴⁰ As seen in the first column of Table 8, the coefficients for competitive manufacturing firms are very similar to the coefficients for the noncompetitive manufacturing subsample reported in the second column. Moreover, statistical tests, not reported in the table for brevity, indicate that the coefficients are not statistically different across the two subsamples.

4-2 Debt overhang and endogenous growth

Several empirical and theoretical studies have suggested that debt overhang [Myers (1977) or Hennessy (2001)] can have detrimental effects on investment. In an empirical study, Lang, Ofek, and Stultz (1996) document a negative relation between investment and leverage for manufacturing firms whose growth opportunities are either not recognized or not sufficiently valuable to overcome the effects of their debt overhang, using Tobin's Q as a proxy. They find no relationship for growth firms. Their results suggest that proxies for growth included on the right-hand side of the target leverage regression may be endogenous for firms with low Tobin's Q, potentially biasing our results in Table 5a. The third and fourth columns of Table 8 present results from estimating target leverage for the subsample of unconstrained manufacturing firm quarters with Tobin's Q of greater than one, and with Tobin's Q of less than or equal to one. The basic results are unchanged, with mixed effects on the macro coefficients across the two subsamples.

⁴⁰The sample includes manufacturing firms in food and kindred products (SIC 2000-2099), textile products (SIC 2200-2299), apparel and related products (SIC 2300-2399), lumber and wood products (SIC 2400-2499), furniture and fixtures (SIC 2500-2599), paper and allied products (SIC 2600-2699), petroleum and coal products (SIC 2900-2999), leather and leather products (SIC 3100-3199) and fabricated metal industries (SIC 3400-3499). Printing and publishing (SIC 2700-2799) is excluded, despite a concentration measure of 18.90, since newspapers and magazines are "highly concentrated, once location in space or type are taken into account" [Rotemberg and Saloner (1986)].

4-3 Mismeasuring the value of debt

This section addresses possible biases introduced by using the book value of debt when measuring leverage. For example, variations in interest rates or shocks to inflation will impact the market value of fixed rate debt, but will not change the book value. This mismeasurement can systematically bias our target estimates if interest rates or inflation change substantially and systematically relative to the macroeconomic variables used in the analysis. Unfortunately, a direct correction of debt valuation is difficult since it depends on the maturity structure of existing debt, variations in the yield curve as well as default spreads. Instead, we address this issue by constructing a subsample of firms that rely on only short-term debt. By restricting attention to issuers of short-term debt we avoid valuations that are stale since book value more closely corresponds with market value for these firms.

We construct a zero-one dummy variable, $robust_{it}$, that equals one if a firm-event window has no long-term debt and an average short-term debt to an asset ratio of at least 5%; there are 98 unconstrained and nine constrained firm-event windows that satisfy these criteria. When estimating the target, $MacroT_{it-3} \times robust_{it}$ is included along with all of the variables described in Section 2. If variations in the market value of fixed rate long-term debt are not biasing the results, the coefficients on $MacroT_{it-3} \times robust_{it}$ should be zero. Looking at the unconstrained firms in Table 9, the robust dummy coefficients are not statistically different from zero. Meanwhile, the statistically significant robust dummy coefficients for the constrained sample have reinforcing signs (*2-year equity market return* $\times robust_i$ and *commercial paper spread* $\times robust_i$). This suggests that mismeasuring the value of debt is not driving our results.

4-4 The unusual leverage of the 1980s

As noted in Bernanke and Campbell (1988), leverage was unusually high throughout the 1980s. This is surprising given that corporate profits and the return on equity was high, and the

average price reaction to equity issues was relatively small in absolute value.⁴¹ The first column of Table 10 presents target leverage estimates for the unconstrained sample using data up to 1988:1.⁴² All three macro coefficients are more extreme with both the 2-year equity market return and 2-year corporate profit statistically more negative than the full sample (test statistics are not reported for brevity). The substantive difference in the variance decomposition is the strong negative covariance of macro and firm, which is expected given that leverage was increasing during this period. The results suggest that the increase in leverage was due to firm-specific variables.

4-5 Time varying volatility

It has long been argued that optimal leverage should be inversely related to the return volatility of the underlying asset. Since volatility moves counter-cyclically [Campbell, Lettau, Malkiel and Xu (2000)], variation in volatility is not driving the counter-cyclical leverage observed for the unconstrained sample. To ensure that counter-cyclical volatility is not driving our results for the constrained sample, we run the target regressions for the subperiod between 1991:2 and 1998:3; Figures 2-4 of Campbell, Lettau, Malkiel and Xu (2000) show this sub-period has relatively stable volatility. The second column of Table 10 shows that the results for the macro variables are more pronounced for this subperiod.

4-6 Mean reversion and leverage deficit

Testing the significance of the target deficit in issue and repurchase choice regressions is similar to testing for mean reversion in capital structure. Under the null of capital structure irrelevance, deviations from the target have no impact on issue or repurchase choices and capital

⁴¹Between 1985:1 and 1988:4 the average price reaction was 1.7. Meanwhile the average price reaction during the expansion in the 1990's (between 1992:1 and 1998:3) was -2.1.

⁴²We were not able to conduct the same exercise for the constrained sample due its small sample size.

structure has a unit root.⁴³ Although the leverage deficit coefficients and standard errors are asymptotically correct under the alternative, they will be biased in small samples (short time series) as well as under the null (see Hamilton p. 488 for example). To see if a bias exists due to our small sample, we construct a zero-one dummy variable, $robust_i$, that equals one if unconstrained firm i has at least fifteen separate event dates.⁴⁴ Fifteen is chosen to ensure the control group is sufficiently large and that each firm has a relatively long time series; the average *robust* firm enters the target regression on 37 separate year-quarters. In total there are 69 *robust* issues and 45 *robust* repurchases. When estimating the second stage, $(Lev_t^* - Lev_{t-3}) \times robust_i$ is included along with all of the variables described in Section 2. If the small sample properties are biasing the results, the coefficient on $(Lev_t^* - Lev_{t-3}) \times robust_i$ should be significant. As seen in Table 11, the coefficients are statistically insignificant.

5 Conclusion

This study tests several models of time variation in financing choice across classes of firms, sorted on a proxy for the extent the firms face financial constraints, by examining the determinants of time variation in leverage ratios and time variation in issue choices between 1984 and 1998.

We find that our financially unconstrained sample has leverage that varies counter-cyclically with macroeconomic conditions, supporting the premise of Levy's (2001) model of capital structure choice where managers prefer debt financing when their compensation is relatively low - following low returns in the equity market or low corporate profits. Moreover, macroeconomic conditions account for 22-72% of the time series variation in leverage. Meanwhile, we find that the financially constrained sample has pro-cyclical leverage with macroeconomic conditions accounting for 12-52% of the time series variation. This is consistent with the balance sheet credit channel models of

⁴³We can easily reject the presence of a unit root for our sample using a Dicky-Fuller test. Results are excluded for brevity.

⁴⁴We were not able to conduct the same exercise for the constrained sample due its small sample size.

Kiyotaki and Moore (1997) and Suarez and Sussman (1999) in which constrained firms borrow more when collateral values are highest - following high returns in the equity market or high corporate profits.

At the issue stage, our results support arguments that firms consider how far they are from their target leverage as well as the marginal costs associated with issuing one security over another. In particular, it seems that unconstrained firms are able to time their issues to periods when the relative pricing of the asset is favorable; deviations from the target account for 15-17% and macroeconomic conditions account for approximately 45% of their time series variation in issue choice. Meanwhile, we find much less evidence of macroeconomic timing on the part of constrained firms. The results indicate that constrained firms deviate from their target by less and their issue choices are much more sensitive to deviations from their target, which accounts for 28-35% of the time series variation in issue choice. Meanwhile, macroeconomic conditions are marginally statistically significant, and account for 18-29% of their time series variation. In short, it seems constrained firms take what they can get.

Our results on repurchases for our unconstrained sample complement those found on issues. Deviations from the target account for 15-23% of the time variation in repurchases and macroeconomic conditions account for 52-66% of the variation. We find a significant role for the average price reaction to equity issue announcements, suggesting that time series variations in the price reaction is capturing more than “windows of opportunity” as described in Bayless and Chaplinsky (1996).

As with previous studies, our results are consistent with elements of both tradeoff and pecking order theories. For example, the fact that deviations from target leverage explain issue choice is consistent with the tradeoff theory while the negative relation between profitability and target leverage is consistent with the pecking order theory. Several of our results indicate that constrained firms fit the pecking order theory less well than unconstrained firms: (i) deviations from target leverage explain a larger fraction of the issue choice for constrained firms than unconstrained firms (ii) constrained firms have pro-cyclical leverage while unconstrained firms have counter-cyclical

leverage, and (iii) macroeconomic conditions play a smaller role in both target leverage and issue choice for constrained firms.

Our results raise a number of interesting issues that can be addressed in future work. First, our results suggest that financing decisions reflect the state of the economy. Since information regarding security issues is contemporaneous, it may be more useful in describing economic conditions than say information regarding earnings that are reported infrequently. Such results are of interest for policy makers as well as the asset pricing literature. For example, our results suggest that the results found in Baker and Wurgler (2000) and Kaplan and Levy (2001), where the ratio of aggregate equity issues to total external financing predicts asset returns, may be due to the covariance between this ratio and business conditions combined with the documented covariance of risk premia and business conditions (see Fama and French (1989) for example). Second, and related to the first point, it would be interesting to address how macroeconomic conditions influence the maturity of debt issues that, at the aggregate level, is documented to vary over time [Gertler and Gilchrist (1993), (1994)] and predicts asset returns [Kaplan and Levy (2001)].

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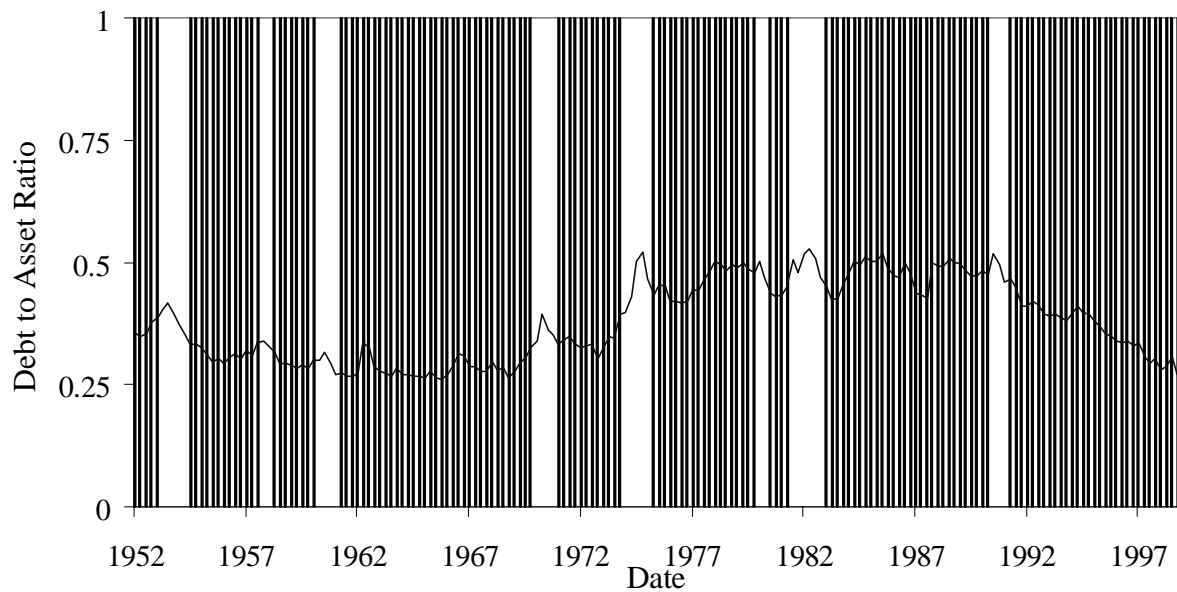


Figure 1. Aggregate nonfinancial corporate debt to asset ratio across NBER expansions (shaded) and contractions (light). Debt to asset ratio is measured as the total credit instruments of nonfinancial corporations measured at book value, divided by the sum of credit market instruments and the market value of equity, as reported in Board of Governors of the Federal Reserve System, “Flow of Funds Accounts.”

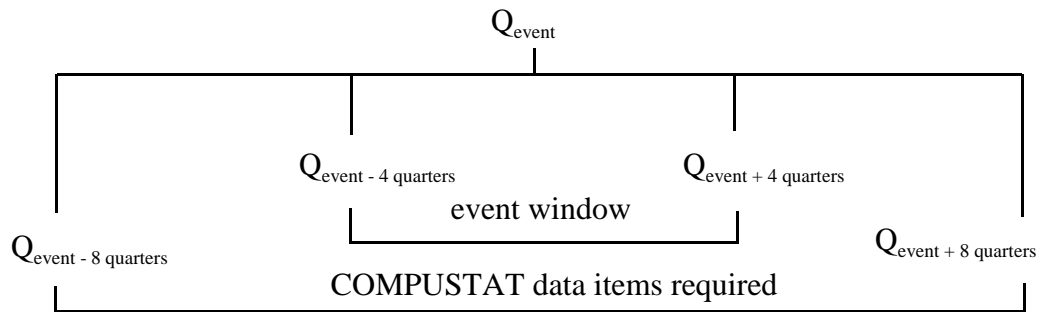


Figure 2. Event windows. An event is a significant change to capital structure; a firm must have the net value of equity (common and preferred) issued or repurchased, the amount of dividends paid, or the change in the book value of debt (straight and convertible) of at least 5% (7% for dividends) of the book value of assets in the previous quarter. In order for a firm to be included in our sample we require the firm to have reported COMPUSTAT data items for eight quarters before and eight quarters after the event as well as 60 months of CRSP data prior to the change in capital structure are required. The event window is then defined the nine quarter window around each event.

Table 1
Mean, [median] and p-value of (mean) and [distribution] equality for nine quarter event-window firm specific variables, 1985:1-1998:3.

The sample is all firms that had CRSP return data five years prior to and COMPUSTAT items eight quarters prior to and eight quarters after a debt or equity issue, or a debt or equity repurchase, or a dividend of at least 5% (7% for dividends) of book assets. Constrained firms do not pay dividends and do not have a net equity or debt purchase over the event window, and have a Tobin's Q of greater than one at the end of the event quarter. Unconstrained firms are firms that are not labeled as constrained. Beta is measured using five years of data prior to the issue, repurchase or dividend. The row labeled cash flow sensitivity presents the coefficient and (standard error) on cash flow (net income plus depreciation) from an OLS regression of investment (capital expenditures less depreciation divided by property plant and equipment) on cash flow, lagged Tobin's Q, and lagged cash as a fraction of assets. The test of distribution equality is a Kolmogorov-Smirnov non-parametric test.

Variable	Unconstrained Firms	p-values of mean and distribution equality	Constrained Firms
Book assets (deflated to 1980 dollars)	410.18 [72.58]	(0.000) [0.000]	113.31 [23.83]
ST+LT Debt/Market assets (percent)	28.98 [25.32]	(0.000) [0.000]	18.66 [14.16]
ST+LT Debt/Book assets (percent)	27.80 [26.32]	(0.445) [0.000]	27.51 [24.10]
Net Income/Book assets (percent)	0.95 [1.21]	(0.000) [0.000]	-0.32 [1.24]
Market/Book	1.32 [1.02]	(0.000) [0.000]	2.12 [1.56]
Capital Expend./Book assets (percent)	4.24 [2.66]	(0.000) [0.000]	7.02 [3.14]
PPE/Book assets (percent)	31.31 [27.01]	(0.000) [0.000]	28.59 [22.23]
Beta	1.032 [1.052]	(0.000) [0.000]	1.128 [1.188]
Cash flow sensitivity	0.018 (0.016)	(0.003)	0.165 (0.048)
Sample size	39,712		4,408

Table 2

Macroeconomic “target” variables: sample correlations and p-value of (correlation) equality across firm classes

The sample is all firms that had CRSP return data five years prior to and COMPUSTAT items eight quarters prior to and eight quarters after a debt or equity issue, or a debt or equity repurchase, or a dividend of at least 5% of book assets. Constrained firms do not pay dividends and do not have a net equity or debt purchase over the event window, and have a Tobin’s Q of greater than one at the end of the event quarter. Unconstrained firms are firms that are not labeled as constrained. The 2-year corp. profit growth is aggregate domestic nonfinancial corporate profit growth using quarterly data from the Flow of Funds and is matched with the firm quarter with the most overlap. The 2-year equity market return is computed from the CRSP value weighted index of stocks traded on NYSE, AMEX and NASDAQ. The commercial paper spread is over the Treasury bill rate. The tests for correlation equality is based on $\frac{1}{2} \ln \frac{1+\hat{\rho}_{Unconst}}{1-\hat{\rho}_{Unconst}} - \frac{1}{2} \ln \frac{1+\hat{\rho}_{Const}}{1-\hat{\rho}_{Const}}$, which is distributed normal with mean 0 and variance $\frac{1}{N_{Unconst}-3} + \frac{1}{N_{Const}-3}$ under the null of correlation equality, where $\hat{\rho}$ is the estimated correlation (see Freund p.524).

Variable	Unconstrained firm-windows (N=39,712)		Constrained firm-windows (N=4,408)	
	$\frac{\text{Debt}}{\text{Book Assets}}$	$\frac{\text{Debt}}{\text{Market Assets}}$	$\frac{\text{Debt}}{\text{Book Assets}}$	$\frac{\text{Debt}}{\text{Market Assets}}$
2-year corp. profit growth	-0.059 (0.007)	-0.080 (0.261)	-0.021	-0.090
2-year equity market return	-0.029 (0.000)	-0.076 (0.000)	0.083	-0.013
Commercial paper spread	0.084 (0.465)	0.094 (0.000)	0.085	0.171

Table 3

Macroeconomic issue variables (percent): means, [medians], p-values of (mean) and [distribution] equality and (overall standard deviations)

The sample is all firm quarters that had an equity or debt issue of at least 5% of book assets. Constrained firms do not pay dividends and do not have a net equity or debt purchase over the event window, and have a Tobin's Q of greater than one at the end of the event quarter. Unconstrained firms are firms that are not labeled as constrained. The three month equity return is the 3-month CRSP value weighted equity market return. The price reaction to equity issue announcements is the average CAPE estimated for day 0 and day +1 using a market model across all nonfinancial and nonutility equity issuers on SDC. The commercial paper spread is over the Treasury bill rate. The term spread is the difference between the long term yield on government bonds and the Treasury bill rate. The default spread is the difference between an average yield on Baa less Aaa Moody's rated bonds. The test of distribution equality is a Kolmogorov-Smirnov non-parametric test.

Variable	Unconstrained firm quarters			Constrained firm quarters			Overall standard deviation
	Equity Issuers (N=362)	p-values of mean and distribution equality	Debt Issuers (N=2,105)	Equity Issuers (N=77)	p-values of mean and distribution equality	Debt Issuers (N=316)	
3 month equity market return	4.16 [4.04]	(0.000) [0.021]	2.72 [3.41]	4.61 [4.04]	(0.018) [0.248]	3.02 [3.78]	(6.52)
Price reaction to equity issue announcements	-1.78 [-1.88]	(0.001) [0.000]	-1.97 [-1.92]	-1.98 [-2.11]	(0.834) [0.718]	-2.00 [-1.97]	(0.99)
Commercial paper spread	0.39 [0.35]	(0.020) [0.004]	0.43 [0.36]	0.32 [0.32]	(0.173) [0.430]	0.36 [0.31]	(0.31)
Term spread	2.60 [2.83]	0.007 [0.002]	2.40 [2.50]	2.60 [2.50]	0.245 [0.051]	2.42 [2.58]	(1.35)
Default spread	0.89 [0.83]	(0.595) [0.374]	0.88 [0.83]	0.83 [0.73]	(0.615) [0.378]	0.81 [0.69]	(2.46)

Table 4

Macroeconomic repurchase variables (percent): means, [medians], p-values of (mean) and [distribution] equality

The sample is all firm quarters that had an equity or debt repurchase of at least 5% of book assets. Constrained firms do not pay dividends and do not have a net equity or debt purchase over the event window, and have a Tobin's Q of greater than one at the end of the event quarter. Unconstrained firms are firms that are not labeled as constrained. The three month equity return is the 3-month CRSP value weighted equity market return. The price reaction to equity issue announcements is the average CAPE estimated for day 0 and day +1 using a market model across all nonfinancial and nonutility equity issuers on SDC. The commercial paper spread is over the Treasury bill rate. The term spread is the difference between the long term yield on government bonds and the Treasury bill rate. The default spread the difference between an average yield on Baa less Aaa Moody's rated bonds. The test of distribution equality is a Kolmogorov-Smirnov non-parametric test.

Variable	Unconstrained firm quarters		
	Equity Repurchase (N=173)	p-values of mean and distribution equality	Debt Repurchase (N=1,645)
3 month equity market return	2.29 [3.43]	(0.231) [0.196]	2.94 [3.41]
Price reaction to equity issue announcements	-1.89 [-1.90]	(0.309) [0.558]	-1.96 [-1.93]
Commercial paper spread	0.49 [0.44]	(0.044) [0.006]	0.44 [0.38]
Term spread	2.29 [2.12]	(0.375) [0.479]	2.39 [2.29]
Default spread	0.88 [0.87]	(0.737) [0.878]	0.89 [0.87]

Table 5a

Macroeconomic determinants of target leverage (Lev) for unconstrained firms - coefficients and (standard errors)

Unconstrained firms are firms that are not labeled as constrained. Constrained firms do not pay dividends and do not have a net equity or debt purchase over the event window, and have a Tobin's Q of greater than one at the end of the event quarter. The 2-year corp. profit growth is aggregate domestic nonfinancial corporate profit growth using quarterly data from the Flow of Funds and is matched with the firm quarter with the most overlap. The 2-year equity market return is computed from the CRSP value weighted index of stocks traded on NYSE, AMEX and NASDAQ. The commercial paper spread is over the Treasury bill rate. All regressions include, but do not report coefficients on a 1986 tax reform dummy, financial and quarterly dummies, the lag of property plant and equipment as a fraction of book assets, the mean operating income as a fraction of assets over the previous four quarters, the mean selling expense as a fraction of sales over the previous four quarters, the mean operating income over the previous four quarters, a fifth order polynomial of the firm's market-to-book ratio, the ratio of the firm's assets-to-the mean assets of firms within each four digit SIC group that quarter, a dummy variable that equals one if the firm has assets that are larger than or equal to the smallest firm that has a debt rating that quarter, and either firm or four digit SIC fixed effects. Standard errors are robust to heteroskedasticity, making no overlapping event-level error structure assumptions. Following Campbell (1991), we calculate asymptotic standard errors for the variance decomposition using the delta method. We treat regression coefficients and the covariance matrix of the macro and firm components as parameters jointly estimated using the Generalized Methods of Moments of Hansen (1982). When cash is netted out, the denominator in our measure of leverage is occasionally negative or very small, resulting in extreme observations. Therefore, we require a firm to have an absolute leverage ratio of less than 3 and require assets, net of cash holdings be positive throughout the event window. Coefficients that are statistically significantly different from zero at the 1%, 5% and 10% are marked with ***, ** and * respectively.

Lev	$\frac{ST+LT\ Debt}{Market\ Assets}$	$\frac{ST+LT\ Debt}{Market\ Assets}$	$\frac{LT\ Debt}{Market\ Assets}$	$\frac{ST+LT\ Debt - Cash}{Market\ Assets - Cash}$	$\frac{ST+LT\ Debt}{Book\ Assets}$
2-year corp. profit growth	-0.089*** (0.014)	-0.092*** (0.020)	-0.049*** (0.013)	-0.037* (0.020)	-0.065*** (0.015)
2-year equity market return	-0.067*** (0.007)	-0.069*** (0.010)	-0.025*** (0.007)	-0.070*** (0.011)	-0.028*** (0.008)
commercial paper spread	3.111*** (0.436)	3.656*** (0.846)	1.642*** (0.421)	3.220*** (0.655)	4.702*** (0.472)
fixed effect	firm	4 digit SIC	firm	firm	firm
number of obs.	39,712	39,712	39,712	39,249	39,712
adjusted R ²	0.818	0.548	0.767	0.790	0.747
macro variance	0.373*** (0.010)	0.323*** (0.013)	0.224*** (0.014)	0.216*** (0.013)	0.724*** (0.013)
firm variance	0.407*** (0.010)	0.389*** (0.014)	0.521*** (0.018)	0.605*** (0.017)	0.383*** (0.013)
2 x covariance	0.220*** (0.001)	0.288*** (0.011)	0.255*** (0.016)	0.179*** (0.011)	-0.107*** (0.002)

Table 5b

Macroeconomic determinants of target leverage (*Lev*) for constrained firms - coefficients, (standard errors) and [p-values] of coefficient equality with unconstrained firms

Constrained firms do not pay dividends and do not have a net equity or debt purchase over the event window, and have a Tobin's Q of greater than one at the end of the event quarter. The 2-year corp. profit growth is aggregate domestic nonfinancial corporate profit growth using quarterly data from the Flow of Funds and is matched with the firm quarter with the most overlap. The 2-year equity market return is computed from the CRSP value weighted index of stocks traded on NYSE, AMEX and NASDAQ. The commercial paper spread is over the Treasury bill rate. All regressions include, but do not report coefficients on a 1986 tax reform dummy, financial and quarterly dummies, the lag of property plant and equipment as a fraction of book assets, the mean operating income as a fraction of assets over the previous four quarters, the mean selling expense as a fraction of sales over the previous four quarters, the mean operating income over the previous four quarters, a fifth order polynomial of the firm's market-to-book ratio, the ratio of the firm's assets-to-the mean assets of firms within each four digit SIC group that quarter, a dummy variable that equals one if the firm has assets that are larger than or equal to the smallest firm that has a debt rating that quarter, and either firm or four digit SIC fixed effects. Standard errors are robust to heteroskedasticity, making no overlapping event-level error structure assumptions. Following Campbell (1991), we calculate asymptotic standard errors for the variance decomposition using the delta method. We treat regression coefficients and the covariance matrix of the macro and firm components as parameters jointly estimated using the Generalized Methods of Moments of Hansen (1982). When cash is netted out, the denominator in our measure of leverage is occasionally negative or very small, resulting in extreme observations. Therefore, we require a firm to have an absolute leverage ratio of less than 3 and require assets, net of cash holdings be positive throughout the event window. Coefficients that are statistically significantly different from zero at the 1%, 5% and 10% are marked with ***, ** and * respectively.

<i>Lev</i>	$\frac{ST+LT\ Debt}{Market\ Assets}$	$\frac{ST+LT\ Debt}{Market\ Assets}$	$\frac{LT\ Debt}{Market\ Assets}$	$\frac{ST+LT\ Debt - Cash}{Market\ Assets - Cash}$	$\frac{ST+LT\ Debt}{Book\ Assets}$
2-year corp. profit growth	0.100*** (0.032) [0.000]	0.065* (0.038) [0.000]	0.082*** (0.023) [0.000]	0.202*** (0.060) [0.000]	0.228*** (0.051) [0.000]
2-year equity market return	0.040** (0.018) [0.000]	0.047** (0.020) [0.000]	0.023 (0.018) [0.017]	0.059** (0.029) [0.000]	0.196*** (0.037) [0.000]
commercial paper spread	1.008 (1.171) [0.092]	1.015 (1.674) [0.155]	0.222 (0.946) [0.171]	1.129 (1.995) [0.319]	4.278*** (1.735) [0.813]
fixed effect	firm	4 digit SIC	firm	firm	firm
number of obs.	4,408	4,408	4,408	4,403	4,408
adjusted R ²	0.842	0.691	0.782	0.790	0.792
macro variance	0.198*** (0.033) [0.000]	0.124*** (0.035) [0.000]	0.157*** (0.033) [0.000]	0.259*** (0.038) [0.000]	0.520*** (0.022) [0.000]
firm variance	0.797*** (0.036) [0.000]	0.885*** (0.038) [0.000]	0.777*** (0.041) [0.000]	0.803*** (0.037) [0.000]	0.286*** (0.019) [0.000]
2 x covariance	0.005*** (0.001) [0.000]	-0.008*** (0.002) [0.000]	0.065** (0.032) [0.013]	-0.037 (0.063) [0.000]	0.193*** (0.008) [0.000]

Table 6
Determinants of issue choice - coefficients and (standard errors)

Constrained firms do not pay dividends and do not have a net equity or debt purchase over the event window, and have a Tobin's Q of greater than one at the end of the event quarter.

Unconstrained firms are firms that are not labeled as constrained. Coefficients represent $\frac{\partial \Pr[\text{debt issue}]}{\partial \text{Variable}}$ and standard errors are in parentheses. $Lev_{i,t}^* - Lev_{i,t-3}$ is the difference between the fitted values from the first stage target regression and actual leverage in the quarter previous to the event. The three month equity return is the 3-month CRSP value weighted equity market return. The price reaction to equity issue announcements is the average CAPE estimated for day 0 and day +1 using a market model across all nonfinancial and nonutility equity issuers on SDC. Lags of the included macro variables in both stages, 3 month lag of corporate profit growth over the previous 3 months, and the lagged growth rate of leading economic variables were used as instruments for the price reaction variable, which is probably measured with error. Although the fitted values have the same unconditional mean, the series is smoother with a standard deviation of 0.006. Probit regressions also include residuals from first stage regression to correct for the bias introduced by including an estimate. The commercial paper spread is over the Treasury bill rate. The term spread is the difference between the long term yield on government bonds and the Treasury bill rate. The default spread is the difference between an average yield on Baa less Aaa Moody's rated bonds. The one year abnormal return, uses a market model with 60 months of data prior to the issue. All regressions include, but do not report coefficients on a 1986 tax reform dummy, financial and calendar quarterly dummies, the mean of capital expenditures as a fraction of assets over the four quarters prior to the event, the mean of selling expenses as a fraction of sales over the four quarters prior to the event, Tobin's Q, mean operating income as a fraction of assets over the four quarters prior to the event, mean tax payments as a fraction of assets over the four quarters prior to the event, and mean depreciation as a fraction of assets over the four quarters prior to the event, the ratio of the firm's assets-to-the mean assets of firms within each four digit SIC group that quarter, a dummy that equals one if the firm has assets that are larger than or equal to the smallest firm that has a debt rating that quarter, the dollar value of the issue as a fraction of assets, a dilution dummy that equals one if an equity issue dilutes the firm's earnings per share more than a debt issue, and a market-to-book ratio dummy that equals one if an equity issue will dilute the firm's book value per share. Standard errors are robust to heteroskedasticity using the Huber/White/sandwich estimator. Coefficients that are statistically significantly different from zero at the 1%, 5% and 10% are marked with ***, ** and * respectively.

Variable	Unconstrained firms				Constrained firms			
	ST or LT debt vs. equity		LT debt vs. equity		ST or LT debt vs. equity		LT debt vs. equity	
	OLS	Probit	OLS	Probit	OLS	Probit	OLS	Probit
$(Lev_{i,t}^* - Lev_{i,t-3})$	1.23*** (0.08)	1.06*** (0.08)	1.50*** (0.12)	1.75*** (0.17)	2.61*** (0.36)	2.26*** (0.35)	2.75*** (0.57)	3.47*** (0.76)
price reaction to equity issue announcements	-6.43*** (1.69)	-5.34*** (1.53)	-8.50*** (2.90)	-9.68*** (3.44)	-2.32 (5.89)	-0.38 (4.25)	-4.26 (8.98)	-4.32 (9.97)
term spread	-1.02** (0.59)	-1.34** (0.59)	-2.36** (1.06)	-3.30*** (1.33)	-1.34 (2.12)	-1.15 (1.95)	-1.15 (3.35)	-1.03 (4.72)
3 month equity market return	-0.22** (0.10)	-0.23** (0.11)	-0.51*** (0.17)	-0.59*** (0.22)	-0.66 (0.36)	-0.67** (0.32)	-1.04** (0.49)	-1.59** (0.68)
commercial paper spread	5.76 (3.82)	3.03 (3.89)	2.75 (6.70)	0.55 (8.04)	3.82 (10.52)	5.06 (8.45)	14.51 (18.11)	26.27 (25.99)
default spread	-0.12*** (0.04)	-0.05 (0.04)	-0.16** (0.07)	-0.15** (0.08)	-0.19 (0.12)	-0.18 (0.09)	-0.38 (0.20)	-0.54** (0.25)
1 year abnormal return	-0.13*** (0.01)	-0.09*** (0.01)	-0.16*** (0.02)	-0.16*** (0.02)	-0.01 (0.02)	-0.02 (0.01)	-0.01 (0.03)	-0.03 (0.04)
number of observations	2,467	2,467	1,424	1,424	393	393	258	258
adjusted R ² / pseudo R ²	0.25	0.31	0.28	0.27	0.36	0.44	0.34	0.34
target deficit variation	0.17*** (0.03)	-	0.15*** (0.03)	-	0.35*** (0.08)	-	0.28*** (0.09)	-
macro variation	0.45*** (0.07)	-	0.45*** (0.07)	-	0.18* (0.10)	-	0.29** (0.13)	-
firm variation	0.32*** (0.04)	-	0.34*** (0.05)	-	0.45*** (0.08)	-	0.37*** (0.09)	-
2xcov(target,macro)	-0.05*** (0.01)	-	-0.06*** (0.02)	-	-0.03 (0.03)	-	-0.09** (0.04)	-
2xcov(target,firm)	0.02** (0.01)	-	0.05*** (0.01)	-	-0.03 (0.04)	-	0.02 (0.04)	-
2xcov(macro,firm)	0.08*** (0.01)	-	0.06*** (0.02)	-	0.08** (0.03)	-	0.14*** (0.04)	-

Table 7

Determinants of repurchase choice (unconstrained firms) - coefficients and (standard errors)

Constrained firms do not pay dividends and do not have a net equity or debt purchase over the event window, and have a Tobin's Q of greater than one at the end of the event quarter. Unconstrained firms are firms that are not labeled as constrained. Coefficients represent $\frac{\partial \text{Pr}[\text{debt issue}]}{\partial \text{Variable}}$ and standard errors are in parentheses. $Lev_t^* - Lev_{t-3}$ is the difference between the fitted values from the first stage target regression and actual leverage in the quarter previous to the event. The three month equity return is the 3-month CRSP value weighted equity market return. The price reaction to equity issue announcements is the average CAPE estimated for day 0 and day +1 using a market model across all nonfinancial and nonutility equity issuers on SDC. Lags of the included macro variables in both stages, 3 month lag of corporate profit growth over the previous 3 months, and the lagged growth rate of leading economic variables were used as instruments for the price reaction variable, which is probably measured with error. Although the fitted values have the same unconditional mean, the series is smoother with a standard deviation of 0.006. Probit regressions also include residuals from first stage regression to correct for the bias introduced by including an estimate. The commercial paper spread is over the Treasury bill rate. The term spread is the difference between the long term yield on government bonds and the Treasury bill rate. The default spread is the difference between an average yield on Baa less Aaa Moody's rated bonds. The commercial paper spread is over the Treasury bill rate. The term spread is the difference between the long term yield on government bonds and the Treasury bill rate. The default spread is the difference between an average yield on Baa less Aaa Moody's rated bonds. The one year abnormal return, uses a market model with 60 months of data prior to the issue. All regressions include, but do not report coefficients on a 1986 tax reform dummy, financial and calendar quarterly dummies, the mean of capital expenditures as a fraction of assets over the four quarters prior to the event, the mean of selling expenses as a fraction of sales over the four quarters prior to the event, Tobin's Q, mean operating income as a fraction of assets over the four quarters prior to the event, mean tax payments as a fraction of assets over the four quarters prior to the event, and mean depreciation as a fraction of assets over the four quarters prior to the event, the ratio of the firm's assets-to-the mean assets of firms within each four digit SIC group that quarter, a dummy that equals one if the firm has assets that are larger than or equal to the smallest firm that has a debt rating that quarter, the dollar value of the repurchase as a fraction of assets, a dilution dummy that equals one if an equity repurchase dilutes the firm's earnings per share more than a debt issue, and a market-to-book ratio dummy that equals one if an equity repurchase will dilute the firm's book value per share. Standard errors are robust to heteroskedasticity using the Huber/White/sandwich estimator. Coefficients that are statistically significantly different from zero at the 1%, 5% and 10% are marked with ***, ** and * respectively.

Variable	ST or LT debt vs. equity		LT debt vs. equity	
	OLS	Probit	OLS	Probit
$(Lev_t^* - Lev_{t-3})$	-0.75*** (0.08)	-0.61*** (0.08)	-1.05*** (0.14)	-1.25*** (0.19)
Price reaction to equity issue announcements	5.45** (2.08)	3.70*** (1.31)	8.55** (3.91)	8.39** (3.32)
term spread	-0.66 (0.77)	-0.15 (0.47)	-0.98 (1.52)	-0.32 (1.20)
3 month equity market return	0.07 (0.10)	0.05 (0.06)	0.12 (0.20)	0.09 (0.17)
Commercial paper spread	-14.97*** (5.15)	-8.99*** (3.17)	-27.50*** (9.14)	-24.11*** (7.91)
default spread	0.11** (0.05)	0.08** (0.03)	0.18** (0.09)	0.18** (0.09)
1 year abnormal return	0.06*** (0.01)	0.04** (0.01)	0.10*** (0.03)	0.07*** (0.02)
Number of observations	1,818	1,818	819	819
Adjusted R ² / Pseudo R ²	0.15	0.26	0.20	0.26
Target deficit variation	0.23*** (0.06)	-	0.15*** (0.04)	-
Macro variation	0.66*** (0.09)	-	0.52*** (0.10)	-
Firm variation	0.26*** (0.07)	-	0.29*** (0.08)	-
2xCov(target,macro)	-0.12*** (0.02)	-	-0.03* (0.02)	-
2xCov(target,firm)	0.07*** (0.02)	-	0.12*** (0.03)	-
2xCov(macro,firm)	-0.11*** (0.02)	-	-0.05* (0.03)	-

Table 8

Macroeconomic determinants of target leverage ($\frac{ST+LT\ Debt}{Market\ Assets}$) for subsamples of unconstrained manufacturing firms - coefficients and (standard errors)

Unconstrained firms are firms that are not labeled as constrained. Constrained firms do not pay dividends and do not have a net equity or debt purchase over the event window, and have a Tobin's Q of greater than one at the end of the event quarter. Competitive industries includes firms with SICs in the range of 2000-2099, 2200-2699, 2900-2999, 3100-3199 and 3400-3499. Noncompetitive industries include firms with SICs in the range of 2000-3999 that are not competitive. Growth firms are defined as manufacturing firms (SICs in the range of 2000-3999 that) that have a Tobin's Q of greater than one, and nongrowth firms are defined as manufacturing firms (SICs in the range of 2000-3999 that) that have a Tobin's Q of less than or equal to one. The 2-year corp. profit growth is aggregate domestic nonfinancial corporate profit growth using quarterly data from the Flow of Funds and is matched with the firm quarter with the most overlap. The 2-year equity market return is computed from the CRSP value weighted index of stocks traded on NYSE, AMEX and NASDAQ. The commercial paper spread is over the Treasury bill rate. All regressions include, but do not report coefficients on a 1986 tax reform dummy, financial and quarterly dummies, the lag of property plant and equipment as a fraction of book assets, the mean operating income as a fraction of assets over the previous four quarters, the mean selling expense as a fraction of sales over the previous four quarters, the mean operating income over the previous four quarters, a fifth order polynomial of the firm's market-to-book ratio, the ratio of the firm's assets-to-the mean assets of firms within each four digit SIC group that quarter, a dummy variable that equals one if the firm has assets that are larger than or equal to the smallest firm that has a debt rating that quarter, and either firm or four digit SIC fixed effects. Standard errors are robust to heteroskedasticity, making no overlapping event-level error structure assumptions. Following Campbell (1991), we calculate asymptotic standard errors for the variance decomposition using the delta method. We treat regression coefficients and the covariance matrix of the macro and firm components as parameters jointly estimated using the Generalized Methods of Moments of Hansen (1982). Coefficients that are statistically significantly different from zero at the 1%, 5% and 10% are marked with ***, ** and * respectively.

	Competitive industries	Noncompetitive industries	Growth firms	Nongrowth firms
2-year corp. profit growth	-0.072** (0.031)	-0.117*** (0.019)	-0.046*** (0.018)	-0.142*** (0.023)
2-year equity market return	-0.082*** (0.010)	-0.070*** (0.011)	-0.033*** (0.010)	-0.099*** (0.012)
commercial paper spread	2.843*** (1.013)	4.052*** (0.598)	2.99*** (0.599)	2.020*** (0.682)
fixed effect	firm	firm	firm	firm
number of obs.	7,572	17,743	13,214	12,101
adjusted R ²	0.839	0.806	0.799	0.810
macro variance	0.325*** (0.025)	0.304*** (0.010)	0.274*** (0.017)	0.686*** (0.020)
firm variance	0.737*** (0.025)	0.344*** (0.011)	0.464*** (0.020)	0.431*** (0.020)
2 x covariance	-0.062*** (0.005)	0.352*** (0.011)	0.262*** (0.015)	-0.116*** (0.003)

Table 9

Relative effect of macroeconomic conditions on target leverage ($\frac{ST+LT\ Debt}{Market\ Assets}$) for firms that use short-term debt - coefficients and (standard errors)

Unconstrained firms are firms that are not labeled as constrained. Constrained firms do not pay dividends and do not have a net equity or debt purchase over the event window, and have a Tobin's Q of greater than one at the end of the event quarter. The 2-year corp. profit growth is aggregate domestic nonfinancial corporate profit growth using quarterly data from the Flow of Funds and is matched with the firm quarter with the most overlap. The 2-year equity market return is computed from the CRSP value weighted index of stocks traded on NYSE, AMEX and NASDAQ. The commercial paper spread is over the Treasury bill rate. $Robust_{it}$ is a zero-one dummy that equals one when a firm-event window has no outstanding long-term debt and at least an average of a 5% short-term debt to book value of assets ratio over the event window; there are 92 unconstrained and 9 constrained firm-event windows that satisfy these criteria. All regressions include, but do not report coefficients on a 1986 tax reform dummy, financial and quarterly dummies, the lag of property plant and equipment as a fraction of book assets, the mean operating income as a fraction of assets over the previous four quarters, the mean selling expense as a fraction of sales over the previous four quarters, the mean operating income over the previous four quarters, a fifth order polynomial of the firm's market-to-book ratio, the ratio of the firm's assets-to-the mean assets of firms within each four digit SIC group that quarter, a dummy variable that equals one if the firm has assets that are larger than or equal to the smallest firm that has a debt rating that quarter, and either firm or four digit SIC fixed effects. Standard errors are robust to heteroskedasticity, making no overlapping event-level error structure assumptions. Coefficients that are statistically significantly different from zero at the 1%, 5% and 10% are marked with ***, ** and * respectively.

	Unconstrained firms	Constrained firms
2-year corp. profit growth	-0.088*** (0.013)	0.103*** (0.033)
2-year equity market return	-0.067*** (0.007)	0.038** (0.018)
commercial paper spread	3.078*** (0.444)	1.095 (1.175)
2-year corp. profit growth \times $robust_{it}$	-0.029 (0.080)	-0.057 (0.153)
2-year equity market return \times $robust_{it}$	0.016 (0.042)	0.104*** (0.041)
commercial paper spread \times $robust_{it}$	1.234 (1.963)	-5.685** (2.809)
fixed effect	firm	firm
number of obs.	39,712	4,408
adjusted R ²	0.818	0.842

Table 10

Effects of macroeconomic conditions on target leverage ($\frac{ST+LT\ Debt}{Market\ Assets}$) for various subperiods

Unconstrained firms are firms that are not labeled as constrained. Constrained firms do not pay dividends and do not have a net equity or debt purchase over the event window, and have a Tobin's Q of greater than one at the end of the event quarter. The 2-year corp. profit growth is aggregate domestic nonfinancial corporate profit growth using quarterly data from the Flow of Funds and is matched with the firm quarter with the most overlap. The 2-year equity market return is computed from the CRSP value weighted index of stocks traded on NYSE, AMEX and NASDAQ. The commercial paper spread is over the Treasury bill rate. All regressions include, but do not report coefficients on a 1986 tax reform dummy, financial and quarterly dummies, the lag of property plant and equipment as a fraction of book assets, the mean operating income as a fraction of assets over the previous four quarters, the mean selling expense as a fraction of sales over the previous four quarters, the mean operating income over the previous four quarters, a fifth order polynomial of the firm's market-to-book ratio, the ratio of the firm's assets-to-the mean assets of firms within each four digit SIC group that quarter, a dummy variable that equals one if the firm has assets that are larger than or equal to the smallest firm that has a debt rating that quarter, and either firm or four digit SIC fixed effects. Standard errors are robust to heteroskedasticity, making no overlapping event-level error structure assumptions. Following Campbell (1991), we calculate asymptotic standard errors for the variance decomposition using the delta method. We treat regression coefficients and the covariance matrix of the macro and firm components as parameters jointly estimated using the Generalized Methods of Moments of Hansen (1982). When cash is netted out, the denominator in our measure of leverage is occasionally negative or very small, resulting in extreme observations. Therefore, we require a firm to have an absolute leverage ratio of less than 3 and require assets, net of cash holdings be positive throughout the event window. Coefficients that are statistically significantly different from zero at the 1%, 5% and 10% are marked with ***, ** and * respectively.

	Unconstrained firms	Constrained firms
Subperiod	prior to 1988:1	1992:2 to 1998:4
2-year corp. profit growth	-0.215*** (0.037)	0.243*** (0.040)
2-year equity market return	-0.150*** (0.012)	0.131*** (0.023)
commercial paper spread	5.477*** (1.152)	-1.761 (1.349)
fixed effect	firm	firm
number of obs.	4,664	3,329
adjusted R ²	0.876	0.818
macro variance	0.765*** (0.040)	0.613*** (0.023)
firm variance	1.152*** (0.031)	0.251*** (0.018)
2 x covariance	-0.918*** (0.046)	0.126*** (0.052)

Table 11
 Probit issue and repurchase estimates for unconstrained firms with multiple events - coefficients and (standard errors)

Unconstrained firms are firms that are not labeled as constrained. Constrained firms do not pay dividends and do not have a net equity or debt purchase over the event window, and have a Tobin's Q of greater than one at the end of the event quarter. $Robust_t$ is a zero-one dummy that equals one when an unconstrained firm has at least fifteen separate event quarters; there are 69 issues and 45 repurchases from firms with multiple events.

Coefficients represent $\frac{\partial Pr[\text{debt issue}]}{\partial \text{Variable}}$ and standard errors are in parentheses. $Lev_t^* - Lev_{t-3}$ is the difference between the fitted values from the first stage target regression and actual leverage in the quarter previous to the event. The three month equity return is the 3-month CRSP value weighted equity market return. The price reaction to equity issue announcements is the average CAPE estimated for day 0 and day +1 using a market model across all nonfinancial and nonutility equity issuers on SDC. Lags of the included macro variables in both stages, 3 month lag of corporate profit growth over the previous 3 months, and the lagged growth rate of leading economic variables were used as instruments for the price reaction variable, which is probably measured with error. Although the fitted values have the same unconditional mean, the series is smoother with a standard deviation of 0.006. Probit regressions also include residuals from first stage regression to correct for the bias introduced by including an estimate. The commercial paper spread is over the Treasury bill rate. The term spread is the difference between the long term yield on government bonds and the Treasury bill rate. The default spread the difference between an average yield on Baa less Aaa Moody's rated bonds. The commercial paper spread is over the Treasury bill rate. The term spread is the difference between the long term yield on government bonds and the Treasury bill rate. The default spread the difference between an average yield on Baa less Aaa Moody's rated bonds. The one year abnormal return, uses a market model with 60 months of data prior to the issue. All regressions include, but do not report coefficients on a 1986 tax reform dummy, financial and calendar quarterly dummies, the mean of capital expenditures as a fraction of assets over the four quarters prior to the event, the mean of selling expenses as a fraction of sales over the four quarters prior to the event, Tobin's Q, mean operating income as a fraction of assets over the four quarters prior to the event, mean tax payments as a fraction of assets over the four quarters prior to the event, and mean depreciation as a fraction of assets over the four quarters prior to the event, the ratio of the firm's assets-to-the mean assets of firms within each four digit SIC group that quarter, a dummy that equals one if the firm has assets that are larger than or equal to the smallest firm that has a debt rating that quarter, the dollar value of the repurchase as a fraction of assets, a dilution dummy that equals one if an equity repurchase dilutes the firm's earnings per share more than a debt issue, and a market-to-book ratio dummy that equals one if an equity repurchase will dilute the firm's book value per share. Standard errors are robust to heteroskedasticity using the Huber/White/sandwich estimator. Coefficients that are statistically significantly different from zero at the 1%, 5% and 10% are marked with ***, ** and * respectively.

	debt vs. equity issues	debt vs. equity purchases
$(Lev_t^* - Lev_{t-3})$	1.11*** (0.09)	-0.61*** (0.08)
$(Lev_t^* - Lev_{t-3}) \times robust_t^\dagger$	-0.28 (0.17)	0.00 (0.16)
Price reaction to equity issue announcements	5.13*** (1.52)	-3.66*** (1.30)
term spread	-1.37*** (0.59)	-0.21 (0.48)
3 month equity market return	-0.24** (0.11)	0.05 (0.06)
commercial paper spread	2.86 (3.93)	-9.16*** (3.22)
default spread	-0.05 (0.04)	0.08** (0.04)
1 year abnormal return	-0.09*** (0.01)	0.03*** (0.01)
Number of observations	2,467	1,818
Pseudo R ²	0.31	0.26