Cross-Market Timing in Security Issuance

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Abstract

The conventional view of market timing suggests an unambiguous, positive relation between equity misvaluation and the equity share in new issues—that is, firms with overvalued equity issue more equity and, all else equal, less debt. We question this conventional view, as well as derive and test additional implications of market timing, in the paper. Using price pressure resulting from mutual fund flow-induced trading to identify equity misvaluation, we first show that equity and debt prices are affected by the same non-fundamental shocks, but to different degrees. Next, we document substantial cross-sectional variation in the sensitivity of issuance decisions to equity misvaluation. Firms with sufficient internal resources issue more equity but less debt in our measure of equity misvaluation; in contrast, firms that are heavily dependent on external finance issue both more equity and debt to take advantage of the misvaluation in both. In sum, this paper shows that equity and debt can be jointly (mis)valued, and more important, the resulting impact on firms' issuance decisions.

Keywords: Debt misvaluation, Market timing, Security issuance, Flow-induced trading.

JEL Classification: G12, G14.

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1 Introduction

Market timing refers to the practice of issuing securities (equity or debt) at abnormally high prices, and repurchasing at abnormally low prices.[1] Prior studies on market timing make the simplifying assumption, either explicitly or implicitly, that equity and debt markets are perfectly segmented—that is, equity misvaluation has no impact on the firm's cost of debt or debt capacity. Consequently, debt issues in the presence of equity misvaluation are simply to "take up the slack" between investment and equity issuance (Stein (1996)). For example, when equity is overvalued, firms issue more equity, and holding investment opportunities constant, less debt. This conventional view of market timing thus unambiguously predicts a positive relation between equity misvaluation and the equity share of new issues (i.e., equity issuance as a fraction of total issuance).

In this paper, we argue that the conventional view of market timing is incomplete. We start by questioning the basic assumption that when equity is misvalued, debt is fairly priced. Asset-pricing theories maintain that a firm's cost of (risky) debt is closely tied to its cost of equity, as both are risky claims on the same underlying assets. There are many channels through which temporary movements in stock prices can result in fluctuations in debt yields. For example, debt holders may infer firm-specific information from movements in equity prices, as equity is in general more responsive to information/demand shocks. To the extent that debt holders are unable to perfectly distinguish noise from value-relevant information in stock prices, debt valuation will reflect the non-fundamental component in equity prices.

If equity and debt are indeed affected by the same non-fundamental shocks, it is then unclear how shocks to equity prices should impact the composition of external financing. In particular, there are two possible forms of market timing that involve issuing different proportions of equity and debt. First, as with the conventional view, since equity and debt are usually misvalued to

[1] Consistent with this market-timing hypothesis, prior research finds that firms issuing both equity and debt underperform their peers subsequently. For example, Ritter (1991), Spiess and Affleck-Graves (1995), and Loughran and Ritter (1995, 2002) document lower abnormal stock returns after both initial and seasoned equity offerings. Lee and Loughran (1998), Dichev and Piotroski (1999), and Spiess and Affleck-Graves (1999) find that both straight and convertible debt issuers have lower subsequent stock returns. There is also supportive evidence of market timing at the market level. Baker and Wurgler (2000) document that a higher share of equity issues in total equity and debt issues forecasts lower stock market returns; Baker, Greenwood, and Wurgler (2003), Greenwood and Hanson (2010), and Greenwood, Hanson, and Stein (2010) show that the share of long-term and non-investment-grade debt issues in total debt issues negatively predicts future excess bond returns. Baker and Stein (2004) argue that market timing does not necessarily require firm managers to have perfect knowledge of their firm value; managers can follow some simple rules of thumb, such as the liquidity of their debt and equity securities.

different degrees, firms can issue the more overvalued security and use the proceeds to reduce the less overvalued security, in a way to benefit from the *relative* misvaluation between the two. Second, since equity and debt are claims on the same underlying assets and are likely to be misvalued in the same direction, firms can increase the issuance of both securities when both are more overvalued, so as to exploit the *absolute* misvaluation in the two securities. The two forms of market timing have different implications for financial policy: the first implies a positive relation between equity misvaluation and the equity share in new issues, while the second makes no such prediction. Consequently, to understand the impact of market timing on firms' financial policy and more generally capital structure, we need to first understand the determinants of firms' market timing behavior in the cross section.

Our empirical analysis is motivated by the theoretical work of Stein (1996) and Baker, Stein, and Wurgler (2003). We also provide a simple stylized model in the spirit of Stein (1996) to illustrate our intuition. In particular, we tie a firm's equity/debt issuance decision to its dependence on external finance, as the amount of capital a firm raises from external sources is ultimately determined by the amount of capital it needs for investment purposes at each point in time. One prediction of our model is that firms with sufficient internal resources act as "arbitrageurs" of their own securities to exploit *relative* misvaluation between equity and debt, as they do not need external capital to fund new investment (and keeping excessive cash within the firm can be costly). More precisely, these firms display a positive sensitivity of equity issues to equity misvaluation and a negative sensitivity of debt issues to equity misvaluation. For example, given a positive price shock in the equity market, we expect firms with sufficient internal resources to issue more equity and less debt.

Our second and main prediction is that as firms become more dependent on external finance, they use a smaller fraction of the proceeds from issuing overpriced equity to reduce debt, and more of the proceeds to increase investment. That is, we should see a rise in the sensitivity of debt issues to equity market shocks with external-finance dependence (i.e., becoming less negative). For firms that are heavily dependent on external finance, we may even observe a positive sensitivity of debt issues to equity market shocks. This is because as firms issue overpriced equity, their equity value declines in issue size (due to, for example, adverse selection and short-term price impact).[2] If the amount of external capital required is sufficiently large, it may be optimal to issue both overpriced

[2]See, for example, Korajczyk, Lucas, and McDonald (1992); Stein (1996).

equity and debt to push investment closer to the first-best level.

To test these predictions, we construct a measure of non-fundamental shocks in the equity market using price pressure resulting from mutual funds' flow-induced trading. A number of recent studies find that mutual funds tend to proportionally invest capital inflows in their existing holdings and proportionally liquidate their existing holdings to meet redemptions. Such flow-induced trading has been shown to impact stock returns, which is then gradually reversed in subsequent years (see, for example, Coval and Stafford (2007), Frazzini and Lamont (2008), and Lou (2012)). Compared with other equity misvaluation measures used in prior literature, such as Tobin's Q, our measure based on mutual fund flows is less affected by other confounding factors (investment opportunities, for example), as retail flows to mutual funds are less likely to reflect firm fundamentals.

More specifically, we construct a measure of fund flows to individual stocks ($FLOW$) by aggregating flow-induced trading across all mutual funds that hold the stock. Consistent with prior studies, we find that $FLOW$ is significantly positively associated with contemporaneous stock returns and negatively predicts future returns. More important, we also find a strong spillover effect on debt pricing: $FLOW$ is negatively associated with contemporaneous changes, and positively forecasts subsequent changes in credit spreads of publicly traded bonds issued by the firm in question. A one-standard-deviation increase in $FLOW$ measured over a year is associated with a contemporaneous drop in credit spreads of 30 basis points, which is almost completely reversed in the next two years. We thus provide one of the first evidence that equity and debt prices may be affected by the same non-fundamental shocks.

Building on this spillover effect, we next analyze firms' debt issuance decisions in response to equity market shocks. On average, firms issue both more equity and more debt in response to mutual fund flow-induced trading in the equity market. Further, there is substantial variation in issuance decisions across firms with different external financing needs. In particular, following Lamont, Polk, and Saa-Requejo (2001) and Baker, Stein, and Wurgler (2003), we use one off-the-shelf measure of external finance dependence, the KZ index, based on the work of Kaplan and Zingales (1997). Consistent with our predictions, non-external-finance-dependent firms issue more equity and less debt in mutual fund flow-induced trading. In contrast, external-finance-dependent firms issue both more equity and more debt in response to $FLOW$. The difference in debt issuance sensitivity to $FLOW$ between external-finance-dependent and non-dependent firms is both economically large and statistically significant. To ensure robustness of our results, we also use a number of alternative measures of external finance dependence: various components of the KZ index (e.g., cash holdings and the dividend payout ratio) and the size/age index of Hadlock and Pierce (2010), and obtain similar results.

Finally, to complement our results on financial policy, we examine firms' investment decisions in response to mutual fund flow-induced trading. On average, firms increase investment after experiencing positive flow-induced price shocks. There is also considerable variation in the investment sensitivity to $FLOW$ in the cross-section. Consistent with the prediction that firms with sufficient internal resources act as "arbitrageurs" of their own securities, these firms display a sensitivity of investment to equity misvaluation that is indistinguishable from zero. In contrast, firms that rely heavily on external finance sharply increase investment when presented with a window of opportunity to raise external capital, thus exhibiting a significantly positive investment sensitivity to equity misvaluation.

Our results on debt and equity issuance in response to equity market shocks suggest that the conventional view of market timing, which predicts a positive relation between equity misvaluation and the equity share in new issues, is incomplete. While the conventional view fits the behavior of non-external-finance-dependent firms, it is inconsistent with the behavior of external-finance-dependent firms. Our results thus call into question the theoretical motivation of prior studies that test a monotonic relation between equity misvaluation and the equity share of new issues.[3]

Moreover, our results have implications for the debate on the real effect of stock market (in)efficiency.[4] Baker, Stein, and Wurgler (2003) provide evidence that equity misvaluation can impact firm investment through a financing channel. Specifically, the authors show that firms that are more dependent on external finance display a stronger sensitivity of investment to non-fundamental shocks to equity value.[5] Our paper complements Baker, Stein, and Wurgler (2003) by suggesting a potential role of debt issuance in this financing channel. When equity is overvalued (and so is debt), firms that do not rely on external capital issue more equity to reduce debt with-

[3]For example, our results provide an alternative explanation for the finding in Butler, Cornaggia, Grullon, and Weston (2010) that the composition of equity and debt issuance has no predictive power for future stock returns after controlling for total issuance.

[4]See, for example, Morck, Shleifer, and Vishny (1990); Gilchrist, Himmelberg, and Huberman (2005); Polk and Sapienza (2008).

[5]More recently, Chaney, Sraer, and Thesmar (2012) show that shocks in the real estate market can affect firms' collateral value, funding costs, and in turn investment.

out changing their investment, while firms heavily dependent on external finance issue both more equity and more debt to increase investment. In other words, debt market timing is closely tied to variation in the investment sensitivity to equity misvaluation across firms with different external financing needs.

Our paper is also related to a number of recent studies that use a similar flow-based price impact measure to study firm reactions to stock misvaluation. For example, Frazzini and Lamont (2008) and Khan, Kogan, and Serafeim (2011) examine equity issuance decisions; Ali, Wei, and Zhou (2011) look at insider selling and the timing of option grants; Edmans, Goldstein, and Jiang (2010) study mergers and acquisitions; Chernenko and Sunderam (2011) and Hau and Lai (2011) analyze firm investment, all in response to mutual fund flow-induced trading. Our paper differs from these studies in that it relates market timing behavior in issuing one security to potential misvaluation in another security, hereby providing additional insights into firms' equity and debt issuance decisions and overturning some conventional view in the market-timing literature.

The paper proceeds as follows. Section 2 presents a simple model to illustrate our predictions. Section 3 describes the data sample and screening procedures. Section 4 examines the impact of mutual fund flow-induced trading on equity and bond returns. Section 5 presents our main results on debt and equity financing decisions in response to equity market shocks. Section 6 discusses alternative explanations and conducts further robustness checks. Finally, section 7 concludes.

2 Hypothesis Development

We use a modified version of the model in Baker, Stein, and Wurgler (2003) to derive some testable hypotheses about external finance dependence, equity/debt issuance, and firm investment decisions. Our model has one firm that can invest K in period 0. The investment yields a total output of $f(K)$ in period 1, where $f(.)$ is an increasing concave production function. The efficient-market discount rate is r, thus the present value of firm investment is $f(K)/(1+r) - K$. It follows immediately that the first-best level of investment K^{fb} is given by $f'(^{fb}) = 1 + r$.

The firm also has financing considerations. Following Baker, Stein, and Wurgler (2003), we assume that the firm's equity can be mispriced by a percentage δ compared to its fundamental value: the firm is overvalued if $\delta > 0$ and is undervalued if $\delta < 0$. The key difference between our model and that in Baker, Stein, and Wurgler (2003) lies in whether debt can also be misvalued. In particular, we assume that when equity is misvalued by a percentage δ, debt is misvalued by $\gamma\delta$, where $\gamma \in (0,1)$ governs the level of debt misvaluation compared to equity; put differently, debt and equity are affected by the same price shocks, with equity being more sensitive to these shocks.

In response to financial market misvaluation, the firm can choose to issue/repurchase equity and debt, subject to the constraint that $-e^{\min} \leq E \leq e^{\max}$ and $-d^{\min} \leq D \leq d^{\max}$, where $e^{\min}$, $e^{\max}$, $d^{\min}$, and $d^{\max}$ are all greater than zero. In other words, we impose upper and lower bounds on how much the firm can issue and repurchase equity and debt. This is essentially a simpler way to model equity and debt issuance costs, compared to a continuous cost function. Similar to Baker, Stein, and Wurgler (2003), we further assume that the firm's financing and investment decisions are linked by a cash constraint, $0 \leq E + D + W - K \leq L$, where W is the amount of cash the firm has in hand (internal resources) at the beginning of period 0. This constraint implies (i) that the firm must generate enough cash through internal or external sources to finance its desired investment, and (ii) that it cannot keep excessive cash after financing all its investment. Finally, to simplify exposition, we assume that the firm cannot invest more than its first-best level, which can be viewed as having prohibitively large adjustment costs to divest in the future.

Given all these considerations, the firm's optimization problem (both in terms of investment and financing) is given by

$$max_{(E,D,K)} \frac{f(K)}{1+r} - K + \delta E + \gamma\delta D, \tag{1}$$

subject to

$$\begin{aligned}
&0 \leq E + D + W - K \leq L \\
&-e^{\min} \leq E \leq e^{\max} \\
&-d^{\min} \leq D \leq d^{\max} \\
&0 < \gamma < 1 \\
&K \leq K^{fb}.
\end{aligned}$$

Proposition 1. *The possible outcomes of the firm's financing and investment decisions can be described as follows:*

1. If $\delta > 0$, we have the following scenarios:

   (a) If $W \in [K^{fb}+L-e^{\max}-d^{\max}, K^{fb}+L-e^{\max}+d^{\min}]$, it follows that $K = K^{fb}$, $E = e^{\max}$, $D = K^{fb} + L - W - e^{\max}$: an overvalued firm with sufficiently large internal resources invests at the first-best level, and issues as much equity as possible.

   (b) If $W \in [K^{fb}-e^{\max}-d^{\max}, K^{fb}+L-e^{\max}-d^{\max}]$, then $K = K^{fb}$, $E = e^{\max}$, $D = D^{\max}$: an overvalued firm with insufficient internal resources invests at the first-best level, and issues as much equity and debt as possible.

2. If $\delta < 0$, we then have:

   (a) If $W \in [K^{fb} + e^{\min} + d^{\min}, K^{fb} + L + e^{\min} + d^{\min}]$, it can be shown that $K = K^{fb}$, $E = -e^{\min}$, $D = -d^{\min}$: an undervalued firm with internal resources in this range invests at the first-best level, and buys back as much equity and debt as possible.

   (b) Define K^{dc} by $f'(K^{dc})/(1+r) = 1-\gamma\delta$. If $W \in [K^{dc}+e^{\min}+d^{\min}, K^{fb}+e^{\min}+d^{\min}]$, it follows that $K \in [K^{dc}, K^{fb}]$, $E = -e^{\min}$, $D = -d^{\min}$: an undervalued firm with internal resources in this range underinvests compared to the first-best level, and buys back as much equity and debt as possible.

   (c) If $W \in [K^{dc} + e^{\min} - d^{\max}, K^{dc} + e^{\min} + d^{\min}]$, then $K = K^{dc}$, $E = -e^{\min}$, $D = K^{dc} + e^{\min} - W$: an undervalued firm with internal resources in this range underinvests, and buys back as much equity as possible.

   (d) Define K^{ec} by $f'(K^{ec})/(1+r) = 1-\delta$. If $W \in [K^{ec} + e^{\min} - d^{\max}, K^{dc} + e^{\min} - d^{\max}]$, then $K \in [K^{ec}, K^{dc}]$, $E = -e^{\min}$, $D = d^{\max}$: an undervalued firm with internal resources in this range underinvests, buys back as much equity as possible, and issues as much debt as possible.

   (e) If $W \in [K^{ec} - e^{\max} - d^{\max}, K^{ec} + e^{\min} - d^{\max}]$, we have $K = K^{ec}$, $E = K^{ec} - d^{\max} - W$, $D = d^{\max}$: an undervalued firm with internal resources in this range underinvests, and issues as much debt as possible.

Proposition 1 is illustrated in Figure 1. The horizontal axis shows misvaluation in the stock market, which can range from undervaluation to overvaluation. The left panel of Figure 1 shows the relations between debt issuance/equity issuance/investment and equity misvaluation for the subsample of external-finance dependent firms, while the right panel shows the same set of relations for non-external-finance-dependent firms. For simplicity, we define external-finance dependence as having internal wealth of $W^{dep} = K^{fb} + L - e^{\max} - d^{\max}$, and non-external-finance-dependence as having internal wealth of $W^{nd} = K^{fb} + L - e^{\max} + d^{\min}$, with the following restrictions on the parameters:

$$0 < e^{\max} - d^{\min} < L < e^{\max} + e^{\min}$$
$$L < e^{\max} + d^{\max} < K^{fb} + L,$$

so that $0 < W^{dep} < K^{fb}$ and $K^{fb} < W^{nd} < K^{fb} + L$.

It is clear from Figure 1 that debt issues depend on the non-fundamental component of stock prices δ, and that the sensitivity of debt issues to δ varies significantly between external-finance dependent and non-dependent firms. As shown in Panel A, for firms with insufficient internal resources, when underpricing is sufficiently severe (region 3), firms optimally choose to reduce debt issues (or even to repurchase debt) at the expense of investment; specifically, debt issuance in region 3 is governed by K^{dc}, which is an increasing function of δ. To the right of region 3, firms always issue as much debt as possible. In short, over the entire range of δ, external-finance-dependent firms exhibit a positive sensitivity of debt issues to equity misvaluation. The relation between equity issues and δ and that between investment and δ are similar to those in Baker, Stein, and Wurgler (2003): in region 1, equity issuance is governed by K^{ec}, which is increasing in δ, and firms underinvest; in the overvaluation region, firms issue as much equity as possible and invest at the first-best level.

Panel B shows the same set of relations for firms with sufficient internal resources. Debt issuance in region A, as governed by K^{dc}, is an increasing function in δ. Yet, over the entire range of δ, non-external-finance-dependent firms exhibit a negative sensitivity of debt issues to equity misvaluation; this is because in the overpricing region, firms without external-financing needs repurchase as much debt as possible to "make room" for equity issues.

To draw a comparison between our model and the conventional view of market timing, we set γ to 0—that is, debt is fairly priced when equity is misvalued—and present the resulting predictions in Figure 2. Consistent with the conventional view, if debt and equity markets are completely segmented, it follows that debt issuance responds negatively to equity misvaluation (δ) for both external-finance-dependent and non-dependent firms. It should be noted, however, that we can increase the sensitivity of debt issuance to equity misvaluation in this framework by imposing a binding leverage constraint (i.e., firms can issue X dollars of debt for every dollar of equity), similar to the approach taken in Baker, Stein, and Wurgler (2003).[6] Implicit in this assumption is that debt capacity rises as firms issue more overpriced equity; or put differently, equity and debt markets are not perfectly segmented.

Based on Proposition 1 and its simplified version illustrated in Figure 1, our main prediction regarding debt issuance, equity misvaluation, and external finance dependence can be described as follows:

Hypothesis 1. *External-finance-dependent firms exhibit a more positive sensitivity of debt issues to equity misvaluation than do non-external-finance-dependent firms. In addition, given the assumptions made in Figure 1, firms that are heavily dependent on external capital can exhibit a positive sensitivity of debt issues to equity misvaluation.*

We label this hypothesis cross-market timing, as it relates the timing behavior in issuing one security to the misvaluation in another security.

3 Data and Main Variables

3.1 Stock and Bond Data

Transaction prices of publicly traded bonds are obtained from two sources.[7] The first data source is the National Association of Insurance Commissioners's (NAIC) bond transaction files, which cover all insurance companies' trading records of publicly traded bonds in the post-1994 period. The second source is the Trade and Reporting Compliance Engine (TRACE) database that initiated coverage in 2002. Compared to NAIC transaction files, TRACE provides more comprehensive coverage of bond transactions by all market participants (as opposed to only insurance companies). Thus, whenever possible, we use pricing information provided by TRACE in our analyses. To reduce data errors in bond prices, we clean up NAIC transaction files following the procedures

[6] Baker, Stein, and Wurgler (2003) never discuss or interpret their model's implication for debt financing.

[7] All analyses that involve bond prices and yields are based on transaction prices. This is to minimize the impact of stale bond prices.

outlined in Schultz (2001) and Campbell and Taksler (2003), and the TRACE database using the procedures suggested in Bessembinder, Kahle, Maxwell, and Xu (2008).

To minimize the impact of remaining data errors, we compute daily volume-weighted average bond prices, and use the last available daily price in each quarter as the quarter-end price. We then compute quarterly bond yields and durations by combining quarter-end bond prices with coupon information. Finally, for the benchmark rate that is needed to calculate credit spreads, we use a linear interpolation of the yields of the two on-the-run government bonds bracketing the corporate bond in terms of duration.

The detailed characteristics of individual bond issues (e.g., the coupon rate, maturity date, offering amount, and various special features) are obtained from the Mergent's Fixed Income Security Database (FISD). The time series of credit ratings for each bond issue is extracted from FISD's rating files. If a bond has ratings from multiple credit rating agencies, we take the average rating across all agencies. We also obtain from Moody's-KMV the historical expected default frequency (EDF) data for nearly all public firms in our sample from January 1994 to December 2009.

We apply several filters to our sample to remove bonds with special features. For example, we exclude all convertible bonds, pay-in-kind bonds, asset-backed securities, Yankee bonds, Canadian bonds, bonds denominated in non-U.S. currencies, floating-rate bonds, unit deals, puttable bonds, exchangeable bonds, perpetual bonds, agency bonds, and bonds issued by quasi-government agencies. Since removing callable bonds would reduce our sample size substantially, we keep them in the sample and correct for this feature in our regressions using a callable dummy. We include only bond-quarter observations for which at least one transaction price is reported by either TRACE or NAIC transaction files.

Finally, information on stock prices, trading volume, and market capitalizations is obtained from the Center for Research in Security Prices (CRSP). Accounting and financial data, such as balance sheet information, earnings, and cash flows, are collected from Standard and Poor's Compustat database. Following the standard approach, we exclude utilities (SIC codes 4900–4999) and financial firms (SIC codes 6000–6999), as well as stocks priced below five dollars a share, from our analyses.

3.2 Mutual Fund Flow-Induced Price Pressure

Our measure of non-fundamental shocks to equity prices is borrowed from the mutual fund flow literature. Following Edmans, Goldstein, and Jiang (2010) and Lou (2012), we construct a measure of mutual fund flows to individual stocks in each quarter as

$$FLOW_{j,t} = \frac{\sum_i shares_{i,j,t-1} * percflow_{i,t}}{\sum_i shares_{i,j,t-1}}, \tag{2}$$

where $shares_{i,j,t-1}$ is the number of shares held by mutual fund i at the end of the previous quarter, and $percflow_{i,t}$ the capital flow to mutual fund i in quarter t as a fraction of its total net assets at the beginning of the quarter. We can also scale $FLOW$ by lagged shares outstanding or trading volume, and the results are by and large unchanged. We then aggregate $FLOW$ in four consecutive quarters to derive an annual measure of $FLOW$, which serves as our main proxy for non-fundamental shocks to equity valuation.

Mutual fund flow and return data are obtained from the CRSP survivorship-bias-free mutual fund database; quarterly stock holdings of mutual funds are obtained from the CDA/Spectrum 13-F mutual fund holdings database. We link the CRSP mutual fund dataset with the CDA/Spectrum holdings database using the MFLINK file. We exclude all international, fixed-income, and precious-metal funds from the sample; in other words, we focus solely on diversified domestic equity mutual funds to construct $FLOW$. Our results are robust to the inclusion or exclusion of sector funds.

3.3 External Finance Dependence

Based on the work of Kaplan and Zingales (1997), Lamont, Polk, and Saa-Requejo (2001) and Baker, Stein, and Wurgler (2003) construct a KZ index to measure external finance dependence. Specifically, the KZ index is defined as

$$KZ_{i,t} = -1.002\frac{CF_{i,t}}{A_{i,t-1}} - 39.368\frac{DIV_{i,t}}{A_{i,t-1}} - 1.315\frac{CASH_{i,t}}{A_{i,t-1}} + 3.139Lev_{i,t} + 0.283Q_{i,t}, \tag{3}$$

where $CF_{i,t}$ is the cash flow of firm i in fiscal year t, A the total assets, DIV the dividend payout ratio, $CASH$ the cash balance, Lev the book leverage, and Q (i.e., Tobin's Q) the market value of equity plus the book value of debt divided by lagged assets. All variables are winsorized at the 1st and 99th percentiles to mitigate the impact of outliers.

Following Baker, Stein, and Wurgler (2003), we exclude Tobin's Q from the construction, as we explicitly control for Q in all our regression specifications. Our results are robust to other commonly used proxies for external finance dependence, such as cash holdings, the dividend payout ratio, and the firm size/age index of Hadlock and Pierce (2010).

3.4 Summary Statistics

Table 1 reports summary statistics of the main variables used in the paper.[8] Our sample spans the period 1980–2009. Consistent with capital inflows to equity mutual funds in our sample period, the average mutual fund flow into an individual stock ($FLOW$) is a positive 3.22%, with a standard deviation of 9.12%. The average credit spread for a publicly traded bond is 2.74%, while the average expected default frequency is 0.74%.[9] In addition, consistent with Fama and French (2005), we also find that public bond issuance is less frequent but has a larger offering size than equity issuance (3.28% vs. 2.62% of lagged firm assets).

Net equity and debt issues in each fiscal year are obtained from Compustat. The average cash flow from all financing activities (as a fraction of lagged total assets) of 7.25% is slightly larger than the sum of average debt and equity issuance (2.71%+3.24%=5.95%); the difference is due to cash dividends and other unclassified financing activities. The average cash (out)flow from all investing activities is -12.91%.[10] Not surprisingly, a significant chunk of firm investment is financed by cash flows from operations.

4 Return Effects of Flow-Induced Trading

Our measure of non-fundamental shocks to stock prices is motivated by prior research on mutual fund flows. Recent studies find that mutual funds tend to expand or liquidate their existing holdings in response to capital flows, and that such flow-induced trading can have a significant impact on individual stock returns (see, for example, Coval and Stafford (2007), Frazzini and Lamont (2008), and Lou (2012)). Compared to other measures of equity misvaluation used in prior literature on

[8] More details regarding variable definitions data sources are provided in the Appendix.

[9] The expected default frequency, as provided by Moody's KMV, is winsorized at 35%. However, there are very few firms with default probability (in the next one year) exceeding 35%.

[10] The negative sign is due to the accounting convention that investment represents cash outflows.

market timing (such as Tobin's Q and lagged (future) stock returns), our measure based on mutual fund flows is less affected by other confounding factors, such as firm growth opportunities, as retail flows to mutual funds are less likely to reflect firm fundamentals. In subsequent analyses, we also control for industry, firm size, and the book-to-market ratio to mitigate the impact of industry and style effects in fund flows. In robustness checks, we further use industry- and style-adjusted capital flows to compute flow-induced trading, and obtain very similar results. Moreover, unlike many other price pressure measures, the price impact of mutual fund flow-induced trading is gradually reversed in the subsequent years, allowing enough time for managers to adjust financing and investment policies.[11]

We start our analysis by replicating prior studies on the stock return effect of mutual fund flow-induced trading. At the end of each quarter, we sort all stocks into deciles based on the aggregate mutual fund flow-induced trading in each stock in the previous year ($FLOW$). We then form a long-short self-financed portfolio that goes long in stocks experiencing the largest flow-induced purchases and short in stocks with the largest flow-induced sales in the previous year. We hold the long-short portfolio for the next two years and report the average monthly return in each quarter.

The results, shown in Table 2, are similar to prior findings. $FLOW$ significantly negatively forecasts monthly stock returns from quarter 3 onward. The long-short hedging portfolio generates equal-weighted monthly excess returns of -32 ($p > 0.1$) and -43 ($p < 0.05$) basis points in the subsequent two years, respectively. In other words, stocks in the top decile ranked by $FLOW$ underperform those in the bottom decile by 9.12% ($p < 0.01$) in the two years after portfolio formation. Adjusting these portfolio returns by the Fama-French three-factor model only marginally reduces the return effect; for example, the difference in the cumulative three-factor alpha between the top and bottom deciles is -8.40% ($p < 0.05$) in the subsequent two years. Moreover, consistent with the notion that mutual funds tend to tilt their holdings toward large and liquid stocks, the return effect of $FLOW$ is stronger for the analogous value-weighted long-short portfolio. The difference in cumulative valued-weighted portfolio returns between the top and bottom $FLOW$ deciles is -12.72% ($p < 0.01$) and that in the cumulative value-weighted three-factor alpha is -12.00% ($p < 0.01$), in the subsequent two years.

[11] The gradual (rather than immediate) reversal of the flow-induced price impact is likely due to the high persistence in mutual fund flows. As flow-induced trading keeps pushing stock prices away from fundamentals in the same direction, the reversal pattern does not appear immediately, but rather after a few quarters.

We next analyze the spillover effect of $FLOW$ on bond prices. Given that equity and debt are claims on the same underlying assets, we expect these two securities to be subject to the same shocks. There are a number of channels through which non-fundamental shocks in the stock market can affect a firm's cost of debt. For example, debt investors may have an incentive to learn information from equity prices as equity returns are more sensitive to firm idiosyncratic shocks.[12] To the extent that bond investors are unable to distinguish information from noise in stock returns, bond prices will reflect non-fundamental shocks in the stock market. Second, arbitrage activities that exploit the gap between a firm's cost of equity and cost of debt can also help spread non-fundamental shocks from one market to the other. In addition, equity and debt can be affected by common shocks to investor preferences and beliefs. For example, if investors are overly optimistic about a firm's future prospects, their overoptimism will be reflected in both equity and bond prices. We remain agnostic as to the exact mechanism of this misvaluation spillover.

We test the spillover effect in a simple regression framework. At the end of each quarter, we calculate the yield-to-maturity for each publicly traded bond issue based on its last daily trading price in the quarter. We then compute its quarter-end credit spread as the difference between its yield-to-maturity and the interpolated Treasury yield with the same duration. We conduct a panel OLS regression with the dependent variable being the quarter-to-quarter change in credit spreads.[13] The main independent variable of interest in the regression is $FLOW$, measured at various horizons. We use quarterly observations in our regressions, because (i) mutual fund holdings are reported at a quarterly frequency, and (ii) trading in many corporate bond issues is infrequent. Our prediction is that $FLOW$ should be negatively associated with contemporaneous credit spread changes, but positively forecast subsequent credit spread changes—in other words, $FLOW$ is positively associated with contemporaneous bond returns but negatively predicts future bond returns.

We also include in our regression a host of control variables that are known to be related to (changes in) credit spreads. For firm characteristics, we include in the regression firm size, the book-to-market ratio, lagged stock returns, market (or book) leverage ratio, the share of tangible

[12]See, for example, Kwan (1996), Gebhardt, Hvidkjaer, and Swaminathan (2005), and Downing, Underwood, and Xing (2009).

[13]We use a panel approach rather than a Fama-MacBeth regression because we are dealing with an unbalanced panel: a disproportionately large fraction of our observations are from the post-2004 period, due to the availability of TRACE data.

assets in total assets, sales growth, return to equity, idiosyncratic volatility of daily stock returns based on the Carhart four-factor model, and the expected default frequency (EDF) provided by Moody's KVM. For bond issue characteristics, we control for the issue size, issue duration (and maturity), and coupon rate, and an indicator function that equals one if the issue is callable and zero otherwise. We also include quarter-fixed effects to absorb common shocks in each quarter. To account for possible correlations within each issuer, we report standard errors that are clustered at the firm level.

The result of the baseline regression is presented in Panel A of Table 3. In each column, $FLOW$ is measured at the end of quarter 0. We then compute credit spread changes from quarters -3 to +8. Consistent with our prediction, $FLOW$ is negatively associated with contemporaneous, and positively predicts future credit spread changes. In particular, a one-standard-deviation increase in $FLOW$ in year 0 (i.e., from quarters -3 to 0) is associated with lower credit spreads of 8.9 ($p < 0.01$), 10.0 ($p < 0.01$), 6.8 ($p < 0.01$), and 3.7 ($p < 0.1$) basis points in quarters -3 through 0, respectively, and forecasts higher credit spreads of 2.2 ($p > 0.1$), 3.1 ($p < 0.1$), 4.8 ($p < 0.05$), 5.2 ($p < 0.01$), 5.0 ($p < 0.01$), and 5.3 ($p < 0.01$) basis points in quarters 3 to 8, respectively. In other words, the cumulative decrease in credit spreads of 29.5 ($p < 0.01$) basis points in the ranking year is almost completely reversed by the end of year two. Taking the average corporate bond duration in our sample of five years, a one-standard-deviation increase in $FLOW$ implies a 1.5% higher bond return in year 0, which is then subsequently reversed. For comparison, a one-standard-deviation increase in $FLOW$ has an impact of 3.0% on stock returns in a similar regression setup. It should not surprise that the effect of $FLOW$ on bond returns is weaker than that on equity returns, as debt is in general less sensitive to price shocks than equity, in particular to shocks in the equity market.

An additional prediction is that the impact of $FLOW$ on bond returns (or credit spreads) should be stronger for bonds that are more sensitive to price shocks. To test this prediction, we classify all publicly traded bond issues into two groups: bonds issued by investment-grade firms and those by non-investment-grade firms (including non-rated firms). For robustness, we also classify bond issues based on issue-specific ratings (rather than issuer ratings), and obtain similar results. As shown in Panels B and C, the effect of $FLOW$ on credit spread changes is statistically zero for the investment-grade sample, and economically and statistically large for non-investment-grade firms.

Specifically, for bonds issued by non-investment-grade firms, a one-standard-deviation increase in $FLOW$ is associated with a 43.4 ($p < 0.01$) basis point decrease in credit spreads in the ranking period, and a 51.8 ($p < 0.01$) basis point increase in credit spreads in years one and two. Based on the average bond duration of five years in our sample, a one-standard-deviation increase in $FLOW$ implies a higher bond return of 2.2% in the ranking period, which is then completely reversed in the subsequent two years.

Taken together, the results shown in this section suggest that mutual fund flow-driven trading in the equity market can affect both equity and debt valuation, and that such flow-induced price effects are only gradually reversed in subsequent years. Given its magnitude and long-lasting impact, the flow-based mechanism of return predictability offers a (relatively) clean and powerful setting to examine managerial behavior in response to potential misvaluation.

5 Cross-Market Timing

Most prior studies on market timing make the simplifying assumption, either implicitly or explicitly, that equity and debt markets are perfectly segmented—that is, irrespective of equity misvaluation, debt is fairly priced. In this framework, debt financing in the presence of equity misvaluation is simply to take up the "slack" between firms' investment and equity market timing. For example, firms with overvalued equity should issue more equity, and all else equal, less debt; the reverse is also true for firms with undervalued equity. This conventional view of market timing unambiguously predicts a positive relation between equity misvaluation and the equity share in new issues.

We argue in this paper that the conventional view is incomplete. Our simple model, in which we relax the assumption that debt valuation is independent from non-fundamental shocks in the equity market, predicts that firms with different needs for external capital exhibit different debt issue sensitivities to equity market shocks. In particular, we predict that external-finance-dependent firms exhibit a more positive sensitivity of debt issues to equity misvaluation than do non-external-finance-dependent firms; in addition, firms that are heavily dependent on external finance may exhibit a positive debt issuance sensitivity to equity market shocks. Put differently, we should not expect to see a monotonic relation between equity misvaluation and the equity share in new issues across all firms.

5.1 Net Debt and Equity Issues

Following Baker, Greenwood, and Wurgler (2003) and Baker, Stein, and Wurgler (2003), we define net debt issuance as the change in book debt, and net equity issuance as the change in book equity minus the change in retained earnings between two consecutive years, both scaled by lagged firm assets. These issuance variables effectively capture all public and private issuance, as well as issues that are expired or repurchased.

To test the cross-market-timing hypothesis, we need a proxy for external finance dependence. Following Lamont, Polk, and Saa-Requejo (2001) and Baker, Stein, and Wurgler (2003), we use one off-the-shelf measure for this purpose based on the work of Kaplan and Zingales (1997). The KZ index is defined as a linear function of the dividend payout ratio, cash flow, cash holdings, leverage ratio, and Tobin's Q, where the coefficients on various components are estimated from a small sample of manufacturing firms. Similar to Baker, Stein, and Wurgler (2003), we exclude Tobin's Q from our definition of the KZ index as we explicitly control for growth opportunities in all our regression specifications. In robustness checks, we also use individual components of the KZ index (e.g., cash holdings and dividend payout ratios), as well as the size/age index introduced by Hadlock and Pierce (2010), to measure external finance dependence, and obtain similar results.

In our main analysis, we conduct the following panel OLS regression:

$$debt\_issue_{i,t} = \beta_0 + \beta_1 FLOW_{i,t-1} + \beta_2 KZ_{i,t-1} + \beta_3 KZ_{i,t-1} * FLOW_{i,t-1} + \Gamma * Control + \varepsilon_{i,t}. \quad (4)$$

The dependent variable in the regression is net debt issuance in fiscal year t. The main independent variable is mutual fund flow-induced trading in the stock ($FLOW$) measured in the previous year. We use the same set of controls for firm characteristics as described in Table 3, except that we replace leverage ratio with leverage gap, defined as the difference between a firm's current leverage ratio and its long-run average leverage ratio. As shown in Fama and French (2002), leverage gap reflects the firm's tendency to adjust its capital structure to its long-run average. We also include in the regression measures of general debt market conditions at the end of the fiscal year end, such as cumulative CRSP value-weighted returns, the term spread between ten-year and three-month Treasury yields, and the credit spread between AAA- and BAA-rated corporate bonds. Further, we include industry- and year-fixed effects to absorb any common variation within industries and years.

Note that since firms have different fiscal year ends within a year, the macroeconomic controls are not absorbed by the year dummies.

Table 4 presents the main regression results. Column 1 examines firms' debt financing decisions. After controlling for a host of potential determinants of debt issues, lagged $FLOW$ significantly positively forecasts future debt issuance. A one-standard-deviation increase in $FLOW$ forecasts a 7.7 (=0.00843*0.0912, $p < 0.1$) basis point increase in total debt issuance as a fraction of lagged firm assets in the following year.

Column 2 conducts a similar analysis as column 1, except that now we also include interaction terms between $FLOW$ and the two indicator variables based on the KZ index: $MedianDependence$ is a dummy variable that takes the value of one if the firm is in the median KZ-index tercile in the previous year, and zero otherwise; $HighDependence$ is another dummy variable that takes the value of one if the firm is in the top KZ-index tercile in the previous year, and zero otherwise. With the presence of these interaction terms, the coefficient on $FLOW$ reflects the sensitivity of debt issuance to equity market shocks for firms in the bottom KZ tercile, while the coefficients on $FLOW$ interacting with $MedianDependence$ and $HighDependence$ dummies capture the differences in this sensitivity between the median and bottom terciles, and that between the top and bottom terciles, respectively.

The results are consistent with the cross-market-timing hypothesis. Firms in the bottom KZ tercile (i.e., firms that are least dependent on external finance) exhibit a significantly negative sensitivity of debt issuance to $FLOW$, while firms in the median and top KZ terciles exhibit more positive sensitivities. Specifically, a one-standard-deviation increase in $FLOW$ forecasts a 14.4 ($p < 0.01$) basis point decrease in debt issuance (as a fraction of lagged firm assets) in the following year for firms in the bottom KZ tercile, while firms in the median and top KZ terciles issue 20.9 ($p < 0.01$) and 40.7 ($p < 0.01$) basis points more debt relative to those in the bottom tercile, respectively. Put differently, a one-standard-deviation increase in $FLOW$ forecasts a 6.5 (insignificant) basis point increase in debt issuance in the median tercile, and a 26.3 ($p < 0.01$) basis point increase in debt issuance in the top tercile. Compared to the average annual debt issuance in our sample of 3.24% of lagged firm assets, these figures are economically meaningful.

To further examine the mechanism of cross-market-timing, we conduct the same set of analyses but now separate total debt issuance into long-term vs. short-term debt issues. Since long-term debt is more sensitive to changes in credit spreads, we expect the cross-market timing behavior to be more pronounced for long-term than for short-term debt. An alternative way to put it is that when credit spreads are abnormally low, firms should issue more long-term debt to lock in the abnormally low cost of debt for a longer period of time.

The regression results for debt with different maturities are reported in columns 3 to 6 in Table 4. Consistent with our prediction, the cross-market-timing behavior is concentrated in long-term debt issues. Specifically, as shown in columns 3 and 4, a one-standard-deviation increase in $FLOW$ forecasts a 8.0 ($p < 0.05$) basis point increase in long-term debt issues in the following year, which is similar in magnitude to that reported in column 1. There is also substantial cross-sectional variation in the sensitivity of long-term debt issues to equity market shocks. Among the least external-finance-dependent firms, a one-standard-deviation increase in $FLOW$ is associated with a 11.6 ($p < 0.05$) basis point reduction in long-term debt issuance in the following year. In contrast, a one-standard-deviation increase in $FLOW$ leads to a 27.1 ($p < 0.01$) basis point increase in long-term debt issuance among the most external-finance-dependent firms. The difference between the top and bottom KZ terciles is statistically significant at the 1% level.

The last two columns of Table 4 present the regression results for short-term debt issues. The coefficients have the right sign, but the magnitudes are much smaller: $FLOW$ predicts a marginally significant reduction in short-term debt issuance among the least external-finance-dependent firms, and has insignificant effect on short-term debt issues for firms in the median and top KZ terciles.

To provide a complete description of firms' financing decisions, we also examine equity issuance as a function of $FLOW$. The regression specification is identical to equation (4), except that now the dependent variable is net equity issuance in fiscal year t. The regression results are shown in Table 5. As can be seen from column 1, equity misvaluation has an economically large and statistically significant impact on equity issuance: A one-standard-deviation increase in $FLOW$ forecasts a 13.3 ($p < 0.01$) basis point increase in equity issues (as a fraction of lagged firm assets) in the following year.

In column 2, we again rank firms into terciles based on their dependence on external capital, and examine the effect of equity misvaluation on subsequent equity issuance in different subsamples. In contrast to debt issuance, the sensitivity of equity issues to $FLOW$ does not vary significantly with external-finance dependence. Specifically, a one-standard-deviation increase in $FLOW$ is associated with 13.8 ($p < 0.01$), 12.1 ($p < 0.01$), and 14.0 ($p < 0.01$) basis point increases in equity issues in the following year for firms in the bottom, median, and top KZ terciles, respectively. The differences in this sensitivity among the three terciles are statistically zero.

As a robustness check, we conduct the same set of analyses using information from the cash-flow statement. The dependent variable in columns 3 and 4 is the net cash flow from all financing activities in fiscal year t, which is roughly the sum of net equity and debt issues, with a residual component that reflects other (unspecified) financing activities. Consistent with our results on equity and debt issuance, equity misvaluation significantly positively forecasts future cash flows from all financing activities. As shown in column 3, a one-standard-deviation increase in $FLOW$ forecasts 35.9 ($p < 0.01$) basis points higher cash flows from financing activities in the following year. There is also substantial variation in the sensitivity of cash flows from financing activities to equity misvaluation across firms with differential external financing needs. A one-standard-deviation increase in $FLOW$ is associated with an insignificant 11.1 basis point increase in net cash flows from financing activities in the least external-finance-dependent tercile, a 27.2 ($p < 0.01$) basis point increase in the median tercile, and a 61.6 ($p < 0.01$) basis point increase in the most dependent tercile in the following year.

Finally, we examine the effect of equity misvaluation on subsequent changes in the leverage ratio. The results are shown in columns 5 and 6. Consistent with the documented equity and debt issuance patterns, we find that while $FLOW$ has no predictive power for subsequent changes in leverage ratio in the full sample, it negatively forecasts leverage ratio changes for non-external-finance-dependent firms but positively for external-finance-dependent firms.

Combined, the results in this section provide a detailed account of how firms adjust their equity and debt financing in response to non-fundamental shocks to equity prices. Specifically, firms that do not rely on external capital—that is, those with sufficient internal resources—substitute between equity and debt to profit from the relative misvaluation between the two securities. In contrast, firms that depend on external sources to finance their desired investment issue both equity and debt when both are more overpriced, so as to exploit the absolute misvaluation.

5.2 Firm Investment

Our main thesis in the paper that external-finance-dependent firms exhibit a more positive sensitivity of debt financing to equity misvaluation than do non-dependent firms is motivated by firms' differential needs for external capital to finance their desired investments. In this section, we explicitly examine firms' investment decisions as a function of mutual fund flow-induced trading to provide further evidence for our hypothesis. Doing so not only helps further our understanding of the underlying driver of different forms of market-timing behavior, but also completes the flow of funds within the firm from issuing overpriced securities.

Following Baker, Stein, and Wurgler (2003), we start by analyzing the sensitivity of capital expenditures to lagged $FLOW$, and how this sensitivity varies across firms. For this purpose, we conduct the same regression analysis as in equation (4), except that now the dependent variable is the capital expenditures (scaled by lagged assets) in fiscal year t. The results, shown in columns 1 and 2 of Table 6, are consistent with prior findings that investment is importantly determined by equity (mis)valuation, in particular for firms that depend on external finance. A one-standard-deviation increase in $FLOW$, on average, forecasts a 24.4 ($p < 0.01$) basis point increase in capital expenditures in the following year. There is also substantial variation in this sensitivity across firms. A one-standard-deviation increase in $FLOW$ leads to an insignificant change in capital expenditures for the least external-finance-dependent firms, and a 55.3 ($p < 0.01$) basis point increase in capital expenditures for the most external-finance-dependent firms.

Next, motivated by Shleifer and Vishny (2003), who argue that firms also engage in more (fewer) acquisitions when their equity is over- (under-)valued, we examine the sensitivity of firms' expenditures on acquisition-related activities to equity misvaluation.[14] The results, shown in columns 3 and 4, are similar to those on capital expenditures. A one-standard-deviation increase in $FLOW$ forecasts 6.6 ($p < 0.1$) basis points higher spending on acquisition activities in the full sample. Sorting firms into terciles based on their dependence on external capital, we find that a one-standard-deviation increase in $FLOW$ is associated with an insignificant change in acquisition spending in the bottom KZ tercile, and a 21.6 ($p < 0.01$) basis point increase in acquisition spending in the top KZ tercile in the following year.

[14] Acquisition spending for each fiscal year is obtained from the section titled "Net Cash Flows from Investing Activities" in the cash flow statement.

For further robustness, instead of going through investment activities one at a time, we examine the sensitivity of net cash flows from all investing activities (including but not limited to capital and acquisition expenditures) to equity misvaluation.[15] As shown in columns 5 and 6, a one-standard-deviation increase in $FLOW$ forecasts a 35.5 ($p < 0.01$) basis points increase in net cash flows from all investing activities. Further, while $FLOW$ is unrelated to cash flows from investing activities among the least external-finance-dependent firms, a one-standard-deviation increase in $FLOW$ is associated with a 68.4 ($p < 0.01$) basis point increase in cash flows from investing activities among the most external-finance-dependent firms.

Take together, our evidence suggests that for the sample of firms without immediate needs for external financing, they issue the more overpriced security and reduce the less overpriced security, while leaving their investment unaffected. In contrast, for firms that depend on external financing, when presented with an opportunity, they issue both more equity and more debt, to push their investment closer to the first-best level.

6 Alternative Explanations and Robustness Checks

6.1 Competing Explanations

In this section, we discuss some alternative explanations for our findings. First, the differences in the sensitivity of equity and debt issuance to $FLOW$ can arise because $FLOW$ potentially captures other sources of variation: broadly speaking, mutual fund flows to individual stocks can reflect both temporary demand shocks and retail investors' perceptions of firm fundamentals. For example, during the Nasdaq bubble, a substantial amount of capital was invested in tech mutual funds, which could reflect both investors' overexcitement about the tech industry and the high investment growth experienced by tech firms.

To begin, we note that our results are robust to sector adjustments. Specifically, we group firms into industries based on the Fama-French 30 industry definition, and repeat our analyses using industry-adjusted $FLOW$.[16] The results are similar to those in Tables 4 through 6, suggesting that the effect of mutual fund flows on equity/debt issuance and firm investment is not entirely driven by sector-wide growth opportunities.

[15] Since investments are cash outflows, the sensitivity estimation will have a negative sign.

[16] We obtain similar results with the Fama-French 48 or 38 industry definitions.

Moreover, for the growth opportunity story to fully explain our results, we need an additional twist: $FLOW$ should mostly reflect uninformed demand shocks (or misvaluation) for non-external-finance-dependent firms, as these firms simply substitute equity for debt in response to $FLOW$ without changing their investment; in contrast, $FLOW$ should mostly reflect rational expectations of growth opportunities for external-finance-dependent firms, as these firms sharply increase both equity and debt issues and investment in response to $FLOW$. This assumption, however, is at odds with prior results. External-finance-dependent firms tend to be smaller, younger, and with less cash holdings compared to non-dependent firms. Most behavioral finance/economics theories would predict that the former is more likely to be misvalued than the latter, which has received much support in the data.[17]

Another alternative interpretation of our equity/debt issuance pattern is that firms have different target leverage ratios, which implies inherently different sensitivities of equity and debt issuance to misvaluation. First of all, it is unclear ex ante why non-external-finance-dependent firms should reduce their leverage ratios while dependent firms should (slightly) increase their leverage ratios in response to $FLOW$, given that dependent firms usually have higher leverage ratios than non-dependent firms to begin with. Nevertheless, we explicitly control for *LeverageGap* proposed by Fama and French (2002), which measures the deviation of a firm's current leverage ratio from its long-run average, in all our regression specifications. If debt issuance in our analysis merely reflects firm tendency to revert back to some long-run average, we expect that the predictive power of $FLOW$ be largely subsumed by *LeverageGap*. This is clearly not the case in the data.

A related argument is that the documented debt issuance pattern can be driven by equity market timing combined with the consideration to maintain some target leverage ratio. We address this possibility by focusing on a subset of firms that do not have any equity issuance in adjacent years. While zero equity issuance is certainly an endogenous choice, our goal here is to show that debt issuance in response to equity market shocks is not entirely driven by equity market timing in adjacent years. Specifically, we include in our sample only firms that do not have significant changes in book equity in years t–5 to t. For example, for debt issuance in fiscal year 2006, we

[17]One could further argue that non-external-finance-dependent firms respond to their growth opportunities faster than do mutual fund investors reallocate their capital. To test this, we examine firm investment in the years before and contemporaneous to the construction of $FLOW$. Consistent with the market-timing hypothesis, non-external-finance-dependent firms do not change their investment in anticipation of future flow-induced trading. In sum, the evidence presented in the paper is unlikely to be fully explained by a growth opportunity interpretation.

include only firms that do not have any equity issues or repurchases in years 2001 to 2006.[18]

The results, omitted for brevity, are similar to those reported in Table 4. Firms in the absence of equity issuance on average issue more debt, in particular long-term debt, in response to equity market shocks. A one-standard-deviation increase in $FLOW$ forecasts a 12.6 ($p < 0.01$) basis point increase in debt issues in the following year. Moreover, there is substantial cross-sectional variation in the debt issuance sensitivity to equity market shocks: While firms without immediate needs for external financing do not change their debt issuance with $FLOW$, for firms that are heavily dependent on external finance, a one-standard-deviation increase in $FLOW$ is associated with a 45.0 ($p < 0.01$) basis point rise in debt issues in the following year.

Finally, the observation that external-finance-dependent firms exhibit a more positive debt issuance sensitivity to equity market shocks than do non-dependent firms may also arise if the spillover effect of $FLOW$ on debt valuation is also stronger for dependent firms. While this interpretation can partially explain the difference in debt issuance in the cross-section, it alone cannot explain why external-finance-dependent firms should exhibit a *positive* debt issuance sensitivity to $FLOW$. Since equity prices are more sensitive to demand shocks in the equity market than debt prices even for firms in the top KZ tercile, if debt issuance is simply to fill the slack between equity issuance and investment, we should still see a negative, rather than positive, sensitivity of debt issuance to $FLOW$ for this subsample of firms.

6.2 Alternative Measures of External Finance Dependence

Our baseline results on cross-market timing are based on the KZ index, which may appear as a black box to some readers. To ensure robustness, we use individual components of the KZ index, as well as other known proxies for internal resource constraints, such as firm size and age, to examine the effect of external finance dependence on the sensitivities of debt and equity issuance to equity market shocks. Among the various components of the KZ index, cash holdings and dividend payments are the two most direct measures of the W variable in our stylized model, which reflects the amount of internal resources a firm has and thus determines firm issuance decisions in our

[18] We define significant changes in book equity as over 10% of lagged total assets in either direction. Our results are also robust to other cutoffs. We look at the previous five years, because prior literature (e.g., Leary and Roberts (2005); Alti (2006); Flannery and Rangan (2006); Kayhan and Titman (2007)) shows that it can take a long time for firms to adjust their leverage ratios back to their optimal level.

setting. We also use the size/age index developed by Hadlock and Pierce (2010) in our analysis, as firm size and age have been shown to be related to the availability of internal resources.

The regression results based on alternative measures of external finance dependence are similar to those in Table 4. As can be seen from Table 7, for all three alternative definitions, firms in the least external-finance-dependent tercile exhibit a negative debt issuance sensitivity to equity misvaluation, while those in the most dependent tercile exhibit a positive debt issuance sensitivity. The difference in this sensitivity between the top and bottom terciles is both economically and statistically significant. In contrast, there is no significant variation in equity issuance across these external-finance-dependence terciles.

We consider two additional measures of external finance dependence. First, cash flows from operations also reflect the amount of internal resources available to the firm. However, in practice, cash flows from operations are also related to the amount of debt a firm can potentially raise. In particular, firms with low (or negative) cash flows from operations are usually denied access to the debt market, which could bias our coefficient estimate in equation (4) in the opposite direction. Another measure of internal resource constraints that we consider is the cash-flow sensitivity of cash, proposed by Almeida, Campello, and Weisbach (2004). However, it requires a long time series to accurately estimate the cash-flow sensitivity of cash at the firm level. Consequently, while our regression coefficients based on cash-flow sensitivities of cash, measured over a rolling window of five years, are in the right direction, they are statistically insignificant.

6.3 Public Bond and Equity Issuance

In our main analysis, we focus on net issuance, which reflects the amount of new securities issued in a year minus the amount of existing securities that are retired or repurchased. For robustness, we also examine firms' public issuance decisions using information from the FISD and SDC databases.[19] This is also to address the concern that part of the net equity issuance constructed from Compustat may be driven by stock option grants to managers and employees (e.g., McKeon (2012)). We aggregate all public bond or equity issues in each quarter, and examine the sensitivity of public issues to lagged mutual fund flow-induced trading. We take two related empirical approaches for

[19] The downside of using the SDC data is that we ignore information in private issuance, and security retirement and repurchases.

this purpose: (i) a logistic regression, where the dependent variable is an indicator that takes the value of one if the firm has at least one public bond (or equity) issue in that quarter, and (ii) a pooled OLS regression where the dependent variable is the total amount of public bond (or equity) issues in the quarter divided by lagged firm assets. The main independent variable in both regressions is $FLOW$ measured in the previous year.

The results are shown in Table 8. The first three columns correspond to bond issuance. Consistent with our result based on Compustat data, $FLOW$ positively forecasts both the likelihood and size of subsequent public bond issuance. A one-standard-deviation increase in $FLOW$ leads to a 0.71 ($p < 0.05$) basis point increase in bond issues in the subsequent quarter. Further, the effect of $FLOW$ on bond issuance is larger for external-finance-dependent firms: A one-standard-deviation increase in $FLOW$ leads to a 3.08 ($p < 0.01$) basis point increase in bond issues for firms in the top KZ tercile. The results for equity issues are shown in columns 4 to 6. Similar to the results in Table 5, $FLOW$ positively and significantly forecasts public equity issues in the following quarter, and there is no variation in the coefficient across firms with different external finance dependence.

6.4 Credit Rating Changes

We show in Table 3 that non-fundamental shocks to equity valuation could impact a firm's cost of debt financing. One possible interpretation of this misvaluation spillover is that debt investors directly infer information from stock price movements. A related, indirect learning channel is that credit rating agencies often use stock valuation as a key input in their credit rating models. To the extent that credit rating agencies are unable to differentiate noise from information in stock prices and that bond investors take credit ratings at face value, non-fundamental movements in equity prices can affect a firm's cost of debt.

To test this idea, we examine the relation between lagged $FLOW$ and future changes in credit ratings. Specifically, we conduct a logistic regression, with the dependent variable being an indicator function that takes the value of one if the bond issue is downgraded in a particular quarter.[20] The independent variable of interest, $FLOW$, is computed in year 0; we then vary the timing of the dependent variable from quarters 1 to 8. The set of control variables is identical to that in Table 3. The results, shown in Table 9, are similar to those in Table 3. $FLOW$ measured at the end of

[20] If a bond issue has credit ratings from multiple rating agencies, we use the average rating across all agencies.

time 0 positively forecasts the likelihood of credit rating downgrades in each of the following eight quarters, and the coefficient is statistically significant in six out of the eight quarters.

6.5 Ex Post Stock Return Tests

While $FLOW$ on average negatively forecasts stock and bond returns, the exact timing and magnitude of the return reversal can vary both over time and across firms. If managers are truly able to time their security issuance, we should expect to see a particularly strong reversal to the flow-induced return effect when firms issue equity or debt. To test this prediction, we include in a standard Fama-MacBeth return forecasting regression two interaction terms between security issuance (both equity and debt) and $FLOW$. We use $FLOW$ measured in year t–2 and issuance in year t–1 to predict monthly returns in year t, in order to ensure that managers have enough time to respond to the price impact in their issuance decisions.

The results, shown in Table 10, are consistent with the market-timing hypothesis. After controlling for $FLOW$, both equity and debt issues significantly negatively forecast future stock returns. More important, the coefficient on the interaction term between equity issues and lagged $FLOW$ is significantly negative, suggesting that firms indeed issue more equity when the reversal to the flow-induced price impact is stronger. The coefficient on the interaction term between debt issues and lagged $FLOW$ is also negative, albeit with marginal statistical significance.

7 Conclusion

Using price pressure resulting from mutual fund flow-induced trading as a measure of temporary shocks to stock prices, we analyze both equity and debt market timing in response to equity misvaluation. In particular, we show that equity and debt prices are affected by the same (non-fundamental) shocks, but to different degrees. We then examine the sensitivities of equity and debt issues to equity market shocks as a function of firms' dependence on external finance. We find that firms with sufficient internal resources exhibit a negative sensitivity of debt issues and a positive sensitivity of equity issues to equity misvaluation, in a way to exploit the relative misvaluation between the two markets. In contrast, firms that are heavily dependent on external finance exhibit positive sensitivities of both equity and debt issues to equity misvaluation, so as to exploit the absolute misvaluation in the two securities. Moreover, these same external-finance-dependent firms exhibit a positive investment sensitivity to equity misvaluation. Overall, our results add to the literature on market timing by linking security issuance in one market to non-fundamental shocks in another market, thus overturning some conventional view in this literature.

Our results also have implications for prior studies on the real effect of market inefficiency. Baker, Stein, and Wurgler (2003) test a financing channel of equity misvaluation impacting firm investment, and show that external-finance-dependent firms exhibit a stronger investment-to-equity-misvaluation sensitivity than do non-external-finance-dependent firms. Our results suggest a potential role of debt financing in this channel. In response to mutual fund flow-induced trading, firms with sufficient internal resources issue more equity and reduce debt, leaving their investment unchanged, while firms dependent on external finance issue both more equity and more debt to increase investment. Put differently, debt market timing is closely tied to variation in the investment sensitivity to equity misvaluation across firms with different external financing needs.

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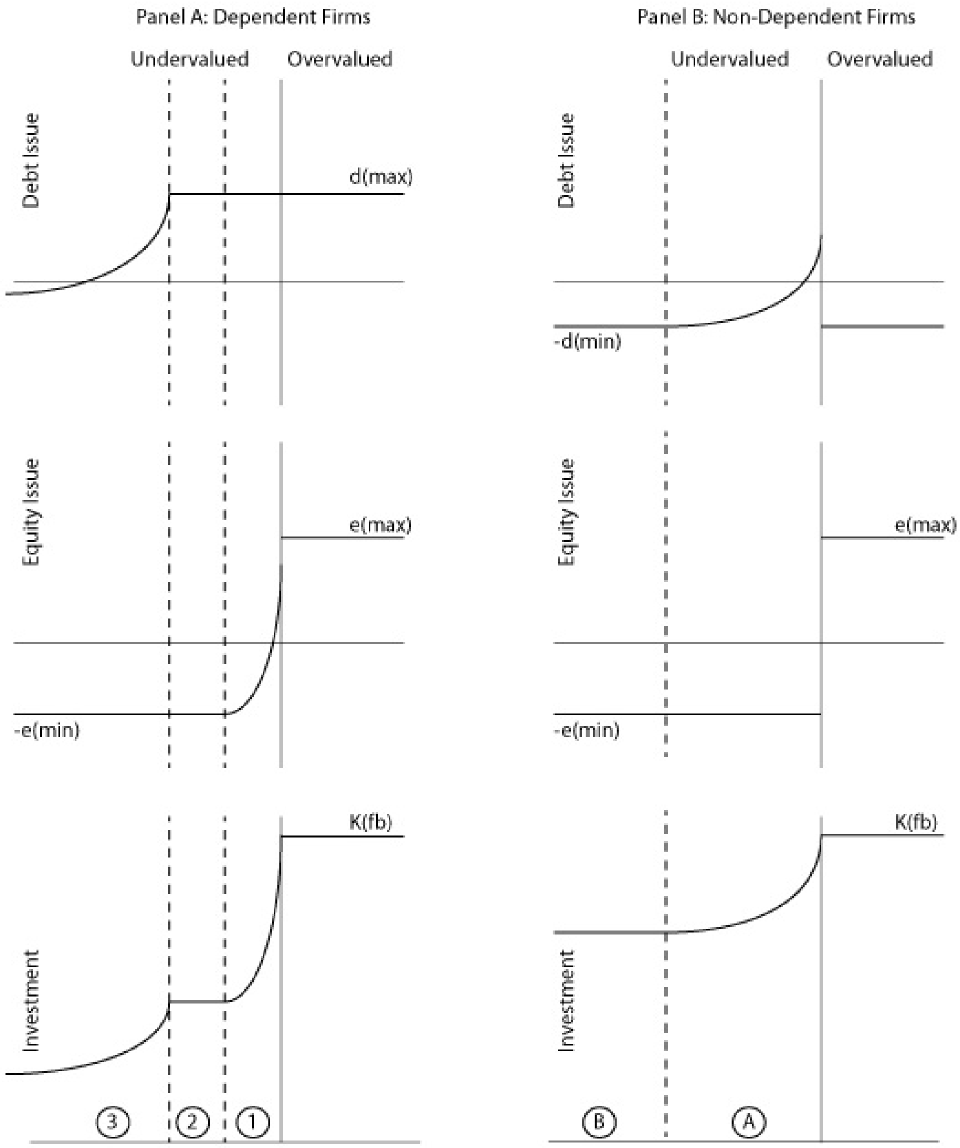

Figure 1: This figure shows the sensitivities of equity issues, debt issues, and investment to equity misvaluation when debt and equity are jointly mispriced.

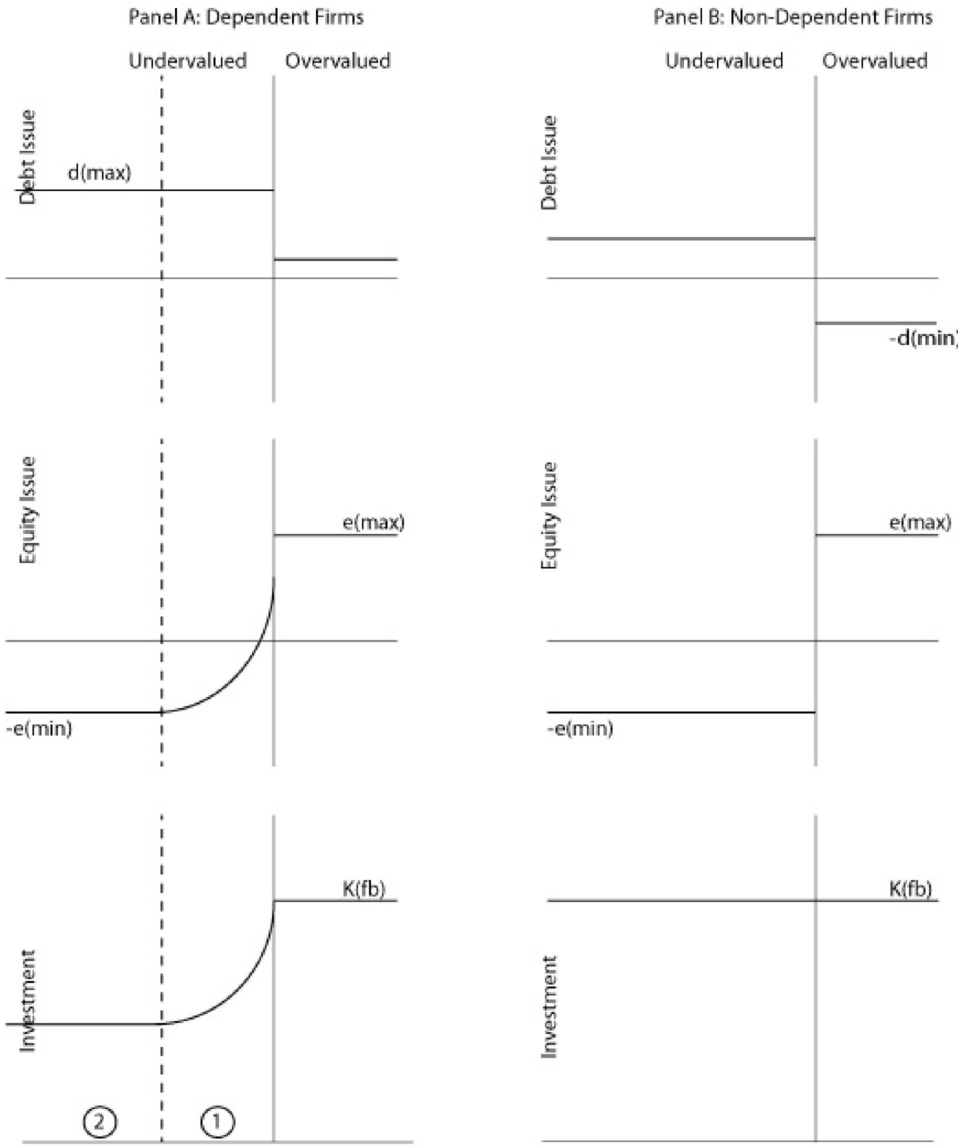

Figure 2: This figure shows the sensitivities of equity issues, debt issues, and investment to equity misvaluation when debt is fairly priced.

Table 1: Summary Statistics

This table provides summary statistics (the 25th, 50th, and 75th percentiles, the mean and median) of the main variables used in this study. Details of variable definitions and data sources are provided in the Appendix (at the end).

Variable Names	Q1	Median	Q3	Mean	Std. Dev.
FLOW	-0.0258	0.0184	0.0809	0.0322	0.0912
Basic Bond Characteristics (FISD)					
Bond Yield Spread	0.011	0.0181	0.0316	0.0274	0.0301
Log(Issue Size)	11.918	12.429	12.899	12.329	1.011
Log(Duration)	1.103	1.603	1.961	1.462	0.796
Basic Stock Information (CRSP)					
Expected Default Frequency (EDF)	0.0500	0.150	0.445	0.741	2.238
Return, Past 1 Year	-0.175	0.0831	0.368	0.184	0.740
Industry Return, Past 1 Year	0.0019	0.132	0.257	0.132	0.217
Idiosyncratic Volatilities	0.0474	0.0639	0.0858	0.0729	0.0384
Firm Fundamentals (Compustat)					
Sales Growth	0.0104	0.0787	0.186	0.156	1.510
Tangibility	0.145	0.250	0.398	0.309	0.219
B/M	0.320	0.570	0.920	0.688	0.618
Size (Relative)	0.0007	0.0028	0.0111	0.0210	0.077
Log(Total Asset)	8.594	9.796	10.971	9.917	1.913
Leverage Gap	-0.105	0.0294	0.168	0.0110	0.277
Leverage	0.0345	0.184	0.400	0.249	0.242
Equity Issuance (Compustat)					
Net Equity Issuance	-0.004	0.0008	0.0126	0.0271	0.108
Debt Issuance (Compustat)					
Total Debt Issuance	-0.0249	0	0.0375	0.0324	0.176
Long-Term Debt Issuance	-0.0193	0	0.0268	0.0314	0.168
Short-Term Debt Issuance	0	0	0	0.0013	0.0353
Investment and Acquisition Activities (*Compustat*)					
Capital Expenditures	0.0239	0.0507	0.101	0.0868	0.121
Acquisition Spending	0	0	0.012	0.0404	0.133
Sources and Uses of Funds (Compustat)					
Net Cash Flow of Financing	-0.0527	-0.0036	0.0619	0.0725	0.360
Net Cash Flow of Investment	-0.154	-0.0688	-0.0231	-0.129	0.248

Table 2: Impact of Mutual Fund Flow-Induced Trading on Stock Returns

This table reports calendar-time monthly returns to a self-financed long-short portfolio, which goes long in the top decile of stocks ranked by mutual fund flow-induced trading ($FLOW$) in a year and goes short in the bottom decile. $FLOW$ is calculated as the aggregate mutual fund flow-induced trading scaled by lagged shares held by mutual funds, then summed over the previous four quarters (quarters -3 to 0). The portfolios are rebalanced every quarter and are held for two years. Both equal- and value-weighted monthly returns are reported. To deal with overlapping portfolios in each holding month, we follow Jegadeesh and Titman (1993) to take the equal-weighted average return across portfolios formed in different quarters. Monthly returns with different risk adjustments are reported: the return in excess of the risk-free rate, the CAPM alpha, and the Fama-French three-factor alpha. The sample period is from 1980 to 2009. Standard errors, shown in parentheses, are adjusted for Newey-West corrections with 12 lags. ***, **, and * indicate a two-tailed test significance level of less than 1%, 5%, and 10%, respectively.

	Equal Weighted			Value Weighted		
	excess return	1-factor alpha	3-factor alpha	excess return	1-factor alpha	3-factor alpha
Qtr 1	-0.15%	-0.25%	-0.14%	-0.32%	-0.48%	-0.20%
	(0.0023)	(0.0026)	(0.0023)	(0.0029)	(0.0032)	(0.0029)
Qtr 2	-0.29%	-0.39%	-0.23%	-0.48%*	-0.64%*	-0.51%
	(0.0023)	(0.0026)	(0.0023)	(0.0029)	(0.0033)	(0.0032)
Qtr 3	-0.40%*	-0.50%**	-0.32%	-0.70%**	-0.88%***	-0.61%*
	(0.0022)	(0.0025)	(0.0024)	(0.0030)	(0.0034)	(0.0031)
Qtr 4	-0.40%*	-0.49%**	-0.49%**	-0.72%**	-0.87%***	-0.66%**
	(0.0021)	(0.0023)	(0.0022)	(0.0029)	(0.0031)	(0.0031)
Qtr 5	-0.41%**	-0.49%**	-0.52%**	-0.65%**	-0.78%***	-0.80%***
	(0.0021)	(0.0022)	(0.0022)	(0.0028)	(0.0028)	(0.0029)
Qtr 6	-0.51%***	-0.57%***	-0.45%**	-0.69%***	-0.81%***	-0.50%**
	(0.0019)	(0.0020)	(0.0020)	(0.0027)	(0.0026)	(0.0023)
Qtr 7	-0.48%***	-0.55%***	-0.36%*	-0.42%*	-0.49%**	-0.30%
	(0.0019)	(0.0020)	(0.0020)	(0.0022)	(0.0023)	(0.0021)
Qtr 8	-0.37%**	-0.43%**	-0.22%	-0.25%	-0.31%	-0.33%
	(0.0019)	(0.0019)	(0.0020)	(0.0022)	(0.0022)	(0.0021)
Qtrs 1-4	-0.32%	-0.41%*	-0.29%	-0.55%**	-0.71%**	-0.50%*
	(0.0020)	(0.0023)	(0.0020)	(0.0026)	(0.0030)	(0.0026)
Qtrs 5-8	-0.43%**	-0.50%***	-0.39%**	-0.49%**	-0.59%***	-0.49%**
	(0.0017)	(0.0017)	(0.0017)	(0.0021)	(0.0022)	(0.0019)
Qtrs 1-8	-0.38%***	-0.45%***	-0.35%**	-0.53%***	-0.65%***	-0.50%***
	(0.0014)	(0.0015)	(0.0014)	(0.0019)	(0.0020)	(0.0018)

Table 3: Impact of Mutual Fund Flow-Induced Trading on Credit Spreads

This table reports the impact of mutual fund flow-induced trading in the equity market on firms' credit spreads. The dependent variable in all regressions is the quarterly change in credit spreads of a particular bond issue. The main independent variable of interest is mutual fund flow-induced trading ($FLOW$) in the equity market measured in year 0 (the ranking year). We analyze credit spread changes in each quarter for the ranking period, as well as for years 1 and 2 in the future. Firm-level control variables include the firm size, book-to-market ratio, cumulative stock return in the previous year, idiosyncratic volatility in the previous year, leverage ratio, expected default frequency (EDF), sales growth, profitability, and tangibility. Bond-level controls include the callable dummy, issue size, bond duration (months, in logarithm), and coupon rate. All regression specifications include quarter-fixed effects. Panel A reports coefficient estimates for the full sample. Panel B reports coefficient estimates for bonds issued by investment-grade firms. Panel C reports coefficient estimates for bonds issued by non-investment-grade fims. The sample period is from 1995 to 2009. Standard errors, reported in parentheses, are adjusted for heteroskedasticity and are clustered at the firm level. ***, **, and * indicate a two-tailed test significance level of less than 1%, 5%, and 10%, respectively.

Panel A: Full Sample				
	Year 0 (Ranking Year)			
	Qtr -3	Qtr -2	Qtr -1	Qtr 0
$FLOW$	-0.00976***	-0.0110***	-0.00748***	-0.00408*
	(0.00268)	(0.00262)	(0.00256)	(0.00241)
	Year 1			
	Qtr 1	Qtr 2	Qtr 3	Qtr 4
$FLOW$	-0.00346	3.86e-05	0.00245	0.00337*
	(0.00246)	(0.00232)	(0.00219)	(0.00202)
	Year 2			
	Qtr 5	Qtr 6	Qtr 7	Qtr 8
$FLOW$	0.00525**	0.00573***	0.00551***	0.00579***
	(0.00213)	(0.00207)	(0.00203)	(0.00200)
Firm Fundamental Controls	YES	YES	YES	YES
Bond Characteristics Controls	YES	YES	YES	YES
Quarter Fixed Effect	YES	YES	YES	YES

Panel B: Investment-Grade Issuers				
	Year 0 (Formation Year)			
	Qtr -3	Qtr -2	Qtr -1	Qtr 0
$FLOW$	-0.00366	-0.00661**	-0.00551*	-0.00428**
	(0.00296)	(0.00322)	(0.00306)	(0.00210)
	Year 1			
	Qtr 1	Qtr 2	Qtr 3	Qtr 4
$FLOW$	-0.00238	0.000204	0.00134	0.00206
	(0.00205)	(0.00182)	(0.00164)	(0.00168)
	Year 2			
	Qtr 5	Qtr 6	Qtr 7	Qtr 8
$FLOW$	0.00325*	0.00294	0.00260	0.00270
	(0.00189)	(0.00198)	(0.00204)	(0.00211)
Firm Fundamental Controls	YES	YES	YES	YES
Bond Characteristics Controls	YES	YES	YES	YES
Quarter Fixed Effect	YES	YES	YES	YES

Panel C: Non-Investment-Grade Issuers				
	Year 0 (Formation Year)			
	Qtr -3	Qtr -2	Qtr -1	Qtr 0
$FLOW$	-0.0148***	-0.0156***	-0.0104**	-0.00678*
	(0.00364)	(0.00399)	(0.00419)	(0.00403)
	Year 1			
	Qtr 1	Qtr 2	Qtr 3	Qtr 4
$FLOW$	-0.00699*	-0.000398	0.00525	0.00752**
	(0.00411)	(0.00388)	(0.00373)	(0.00344)
	Year 2			
	Qtr 5	Qtr 6	Qtr 7	Qtr 8
$FLOW$	0.0111***	0.0135***	0.0135***	0.0133***
	(0.00359)	(0.00331)	(0.00316)	(0.00316)
Firm Fundamental Controls	YES	YES	YES	YES
Bond Characteristics Controls	YES	YES	YES	YES
Quarter Fixed Effect	YES	YES	YES	YES

Table 4: Debt Issuance and Mutual Fund Flow-Induced Trading

This table reports firms' debt issuance decisions in response to mutual fund flow-induced trading in the equity market. The dependent variable in columns 1 and 2 is the total debt issuance in fiscal year t as reported by Compustat. We then separate total debt issuance into long-term (columns 3 and 4) and short-term debt issuance (columns 5 and 6). All issuance variables are scaled by lagged firm assets. The main independent variable of interest is the aggregate mutual fund flow-induced trading ($FLOW$) measured in the previous year. Firm-level control variables include firm size, book-to-market ratio, cumulative stock return in the previous year, cumulative stock return in previous years two and three, leverage gap, sales growth, profitability, and tangibility. Macroeconomic control variables include the past one year CRSP value-weight index return, term spread, and default spread. All regression specifications include industry- and year-fixed effects. In columns 2, 4, and 6, the *Median Dependence* dummy takes the value of one if the firm is in the middle 40% of the KZ-index distribution, and zero otherwise; the *High Dependence* dummy takes the value of one if the firm is in the top 30% of the KZ-index distribution, and zero otherwise. The sample period is from 1982 to 2009. Standard errors, reported in parentheses, are adjusted for heteroskedasticity and are clustered at the firm level. ***, **, and * indicate a two-tailed test significance level of less than 1%, 5%, and 10%, respectively.

	Total Debt Issuance		Long-Term Debt Issuance		Short-Term Debt Issuance	
	(1)	(2)	(3)	(4)	(5)	(6)
$FLOW$	0.00843*	-0.0158**	0.00879**	-0.0127**	-0.000287	-0.00266*
	(0.00464)	(0.00617)	(0.00443)	(0.00589)	(0.000989)	(0.00149)
$FLOW$ x Medium Dependence		0.0229***		0.0178**		0.00355*
		(0.00860)		(0.00819)		(0.00208)
$FLOW$ x High Dependence		0.0446***		0.0424***		0.00285
		(0.0113)		(0.0110)		(0.00219)
Median Dependence		0.0112***		0.0114***		0.000219
		(0.00162)		(0.00157)		(0.000364)
High Dependence		0.0318***		0.0309***		0.000548
		(0.00251)		(0.00239)		(0.000448)
Firm Fundamental Controls	YES	YES	YES	YES	YES	YES
Macroeconomics Controls	YES	YES	YES	YES	YES	YES
Industry Fixed Effect	YES	YES	YES	YES	YES	YES
Year Fixed Effect	YES	YES	YES	YES	YES	YES
Number of Observations	55,273	55,273	55,273	55,273	55,273	55,273
Adjusted R^2	0.067	0.072	0.065	0.070	0.008	0.008

Table 5: Other Financing Decisions

This table reports equity issuance and leverage ratio changes in response to mutual fund flow-induced trading in the equity market. The dependent variable in columns 1 and 2 is net equity issuance, that in columns 3 and 4 is the net cash flow from all financing activities, and that in columns 5 and 6 is the change in the leverage ratio, all measured in fiscal year t as reported by Compustat. Both equity issuance and net cash flows from financing are scaled by lagged firm assets. The main independent variable of interest is the aggregate mutual fund flow-induced trading ($FLOW$) measured in the previous year. Firm-level control variables include firm size, book-to-market ratio, cumulative stock return in the previous year, cumulative stock return in previous years two and three, leverage-gap, sales growth, profitability, and tangibility. Macroeconomic control variables include the past one year CRSP value-weight index return, term spread, and default spread. All regression specifications include industry- and year-fixed effects. In columns 2, 4, and 6, the *Median Dependence* dummy takes the value of one if the firm is in the middle 40% of the KZ-index distribution, and zero otherwise; the *High Dependence* dummy takes the value of one if the firm is in the top 30% of the KZ-index distribution, and zero otherwise. The sample period is from 1982 to 2009. Standard errors, reported in parentheses, are adjusted for heteroskedasticity and are clustered at the firm level. ***, **, and * indicate a two-tailed test significance level of less than 1%, 5%, and 10%, respectively.

	Total Equity Issuance		Net CF from Financing		Leverage Ratio Change	
	(1)	(2)	(3)	(4)	(5)	(6)
$FLOW$	0.0146***	0.0151***	0.0393***	0.0122	0.000209	-0.00758**
	(0.00253)	(0.00399)	(0.00980)	(0.0133)	(0.00208)	(0.00306)
$FLOW$ x Medium Dependence		-0.00180		0.0176		0.0123***
		(0.00522)		(0.0173)		(0.00417)
$FLOW$ x High Dependence		0.000300		0.0553**		0.00904*
		(0.00608)		(0.0240)		(0.00493)
Median Dependence		0.00452***		0.0236***		-0.00535***
		(0.00114)		(0.00313)		(0.000739)
High Dependence		0.0144***		0.0671***		-0.00912***
		(0.00151)		(0.00480)		(0.000988)
Firm Fundamental Controls	YES	YES	YES	YES	YES	YES
Macroeconomics Controls	YES	YES	YES	YES	YES	YES
Industry Fixed Effect	YES	YES	YES	YES	YES	YES
Year Fixed Effect	YES	YES	YES	YES	YES	YES
Number of Observations	62,640	62,640	55,412	55,412	54,631	54,631
Adjusted R^2	0.228	0.230	0.170	0.172	0.043	0.044

Table 6: Firm Investment and Mutual Fund Flow-Induced Trading

This table reports firms' investment decisions in response to mutual fund flow-induced trading in the equity market. The dependent variable in columns 1 and 2 is the capital expenditures, that in columns 3 and 4 is the total spending in acquisition activities, and that in columns 5 and 6 is the net cash flow from all investing activities, all measured in fiscal year t as reported by Compustat. All three variables are scaled by lagged firm assets. The main independent variable of interest is the aggregate mutual fund flow-induced trading ($FLOW$) measured in the previous year. Firm-level control variables include firm size, book-to-market ratio, cumulative stock return in the previous year, cumulative stock return in previous years two and three, leverage gap, sales growth, profitability, and tangibility. Macroeconomic control variables include the past one year CRSP value-weight index return, term spread, and default spread. All regression specifications include industry- and year-fixed effects. In columns 2, 4, and 6, the *Median Dependence* dummy takes the value of one if the firm is in the middle 40% of the KZ-index distribution, and zero otherwise; the *High Dependence* dummy takes the value of one if the firm is in the top 30% of the KZ-index distribution, and zero otherwise. The sample period is from 1982 to 2009. Standard errors, reported in parentheses, are adjusted for heteroskedasticity and are clustered at the firm level. ***, **, and * indicate a two-tailed test significance level of less than 1%, 5%, and 10%, respectively.

	Capital Expenditures		Acquisitions		Net CF from Investment	
	(1)	(2)	(3)	(4)	(5)	(6)
$FLOW$	0.0267***	-5.51e-05	0.00721*	-0.00312	-0.0389***	-0.00716
	(0.00663)	(0.00465)	(0.00371)	(0.00688)	(0.00725)	(0.0104)
$FLOW$ x Medium Dependence		0.0164***		0.00198		-0.0197
		(0.00635)		(0.00831)		(0.0135)
$FLOW$ x High Dependence		0.0606***		0.0268***		-0.0678***
		(0.0212)		(0.00964)		(0.0176)
Median Dependence		0.0259***		0.00338*		-0.0241***
		(0.00215)		(0.00188)		(0.00299)
High Dependence		0.0327***		0.00425*		-0.0309***
		(0.00273)		(0.00219)		(0.00393)
Firm Fundamental Controls	YES	YES	YES	YES	YES	YES
Macroeconomic Controls	YES	YES	YES	YES	YES	YES
Industry Fixed Effect	YES	YES	YES	YES	YES	YES
Year Fixed Effect	YES	YES	YES	YES	YES	YES
Number of Observations	62,025	62,025	55,412	55,412	55,412	55,412
Adjusted R^2	0.242	0.255	0.072	0.072	0.170	0.172

Table 7: Alternative Measures of External-Finance Dependence

This table reports firms' debt and equity issuance decisions in response to mutual fund flow-induced trading in the equity market. In particular, we repeat the analyses in Tables 4 and 5 but now with alternative measures of external finance dependence. In Panel A, we sort firms into terciles based on cash holdings (scaled by lagged total assets) in the previous year. In Panel B, we sort firms into terciles based on the dividend payout ratio in the previous year; in Panel C, we sort firms into terciles based on the size-age Index (SA-Index) developed in Hadlock and Pierce (2010). The *Median Dependence* dummy takes the value of one if the firm is in the middle 40% of the cash holdings, dividend payout ratio, or SA-index distribution, and zero otherwise; the *High Dependence* dummy takes the value of one if the firm is in the top 30% of the cash holdings, dividend payout ratio, or SA-index distribution, and zero otherwise. Standard errors, reported in parentheses, are adjusted for heteroskedasticity and are clustered at the firm level. ***, **, and * indicate a two-tailed test significance level of less than 1%, 5%, and 10%, respectively.

	Debt Issuance		Equity Issuance	
	(1)	(2)	(3)	(4)
Panel A: Cash Holdings				
$FLOW$	0.008*	-0.013*	0.015***	0.010*
	(0.005)	(0.008)	(0.003)	(0.005)
$FLOW$ x Medium Dependence		0.023**		0.009
		(0.010)		(0.006)
$FLOW$ x High Dependence		0.042***		0.003
		(0.011)		(0.006)
CONTROLS	YES	YES	YES	YES
Number of Observations	62,718	62,718	62,872	62,872
Adjusted R^2	0.068	0.070	0.228	0.231
Panel B: Dividend Payout Ratio				
$FLOW$	0.00688	-0.0171**	0.0151***	0.00637**
	(0.00469)	(0.00678)	(0.00254)	(0.00265)
$FLOW$ x Medium Dependence		0.0373***		0.00566
		(0.00944)		(0.00371)
$FLOW$ x High Dependence		0.0273**		0.00631
		(0.0138)		(0.00638)
CONTROLS	YES	YES	YES	YES
Number of Observations	62,116	55,380	62,269	62,269
Adjusted R^2	0.068	0.086	0.228	0.249
Panel C: Size and Age Index				
$FLOW$	0.008*	-0.009*	0.015***	0.007*
	(0.005)	(0.006)	(0.003)	(0.004)
$FLOW$ x Medium Dependence		0.035***		0.007
		(0.009)		(0.005)
$FLOW$ x High Dependence		0.045***		0.006
		(0.013)		(0.006)
CONTROLS	YES	YES	YES	YES
Number of Observations	62,718	62,718	62,872	62,872
Adjusted R^2	0.068	0.075	0.228	0.234

Table 8: Public Bond and Equity Issues

This table reports firms' public bond and equity issuance decisions in response to mutual fund flow-induced trading in the equity market. The dependent variable in column 1 is a binary variable that takes the value of one if there is at least one public bond issue in the quarter, and zero otherwise (i.e., a logit regression), and that in columns 2 and 3 is the total dollar amount of bond issuance in the quarter, scaled by lagged firm assets. Both variables are constructed from the FISD database and are available for the period of 1995 to 2009. The dependent variable in column 4 is a binary variable that takes the value of one if there is at least one public equity issue in the quarter, and zero otherwise (i.e., a logit regression), and that in columns 5 and 6 is the total dollar amount of equity issuance in the quarter, scaled by lagged firm assets. Both variables are constructed from the SDC database and are available for the period of 1982 to 2009. The main independent variable of interest is the aggregate mutual fund flow-induced trading ($FLOW$) measured in the previous year. Firm-level control variables include firm size, book-to-market ratio, cumulative stock return in the previous year, cumulative stock return in previous years two and three, leverage gap, sales growth, profitability, and tangibility. All regression specifications include industry- and quarter-fixed effects. Standard errors, reported in parentheses, are adjusted for heteroskedasticity and are clustered at the firm level. ***, **, and * indicate a two-tailed test significance level of less than 1%, 5%, and 10%, respectively.

	Public Bond Issuance			Public Equity Issuance		
	(1)	(2)	(3)	(4)	(5)	(6)
$FLOW$	0.452***	0.000781**	-0.000266	0.340***	0.00199***	0.00202**
	(0.117)	(0.000333)	(0.000428)	(0.0891)	(0.000578)	(0.000973)
$FLOW$ x Medium Dependence			-0.000116			0.00101
			(0.000556)			(0.00121)
$FLOW$ x High Dependence			0.00338***			-0.00138
			(0.00102)			(0.00136)
Medium Dependence			-0.000192			0.000989***
			(0.000196)			(0.000203)
High Dependence			0.00100***			0.00287***
			(0.000287)			(0.000351)
Firm Fundamental Controls	YES	YES	YES	YES	YES	YES
Industry Fixed Effect	YES	YES	YES	YES	YES	YES
Quarter Fixed Effect	YES	YES	YES	YES	YES	YES
Number of Observations	123,235	123,235	123,235	266,919	266,919	266,919
Pseudo/Adjusted R^2	0.278	0.024	0.025	0.072	0.017	0.018

Table 9: Credit Rating Changes

This table reports credit rating changes in response to mutual fund flow-induced trading in the equity market. The dependent variable in all regressions is a dummy variable that takes the value of one if the bond issue experiences a credit rating downgrade in the quarter and zero otherwise (i.e., logit regressions). If a bond issue has ratings from multiple rating agencies, the average rating is used. Columns 1 through 8 report the regression results for the subsequent eight quarters. The main independent variable of interest is the aggregate mutual fund flow-induced trading ($FLOW$) measured in the previous year (quarters -3 to 0). Firm-level control variables include firm size, book-to-market ratio, cumulative stock return in the previous year, idiosyncratic volatility in the previous year, leverage ratio, expected default frequency (EDF), sales growth, profitability, and tangibility. Bond-level controls include the callable dummy, issue size, bond duration (months, in logarithm), and coupon rate. All regression specifications include quarter-fixed effects. The sample period is from 1995 to 2009. Standard errors, reported in parentheses, are adjusted for heteroskedasticity and are clustered at the firm level. ***, **, and * indicate a two-tailed test significance level of less than 1%, 5%, and 10%, respectively.

	Dependent Variable: Credit Rating Downgrade							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 5	Qtr 6	Qtr 7	Qtr 8
$FLOW$	0.439	0.823	1.202**	1.509***	1.771***	1.826***	1.492***	0.953*
	(0.671)	(0.621)	(0.534)	(0.512)	(0.504)	(0.502)	(0.504)	(0.493)
Bond Yield	5.895***	5.886***	5.800***	5.754***	5.736***	5.719***	5.716***	5.763***
	(1.376)	(1.378)	(1.375)	(1.377)	(1.379)	(1.381)	(1.387)	(1.392)
Firm Fundamental Controls	YES	YES	YES	YES	YES	YES	YES	YES
Bond Characteristics Controls	YES	YES	YES	YES	YES	YES	YES	YES
Quarter Fixed Effect	YES	YES	YES	YES	YES	YES	YES	YES
Number of Observations	117,606	117,590	117,432	117,153	116,844	116,504	116,172	115,799
Pseudo R^2	0.1777	0.1779	0.1790	0.1800	0.1809	0.1815	0.1812	0.1801

Table 10: Return Predictability of Security Issuance

This table reports Fama-MacBeth forecasting regressions of stock returns. The dependent variable is the monthly stock return in year t. The explanatory variables include the aggregate mutual fund flow-induced trading ($FLOW$) measured in year t-2, net equity issues (as a fraction of lagged firm assets) in year t-1, and net long-term debt issues (as a fraction of lagged firm assets) in year t-1. We also include interaction terms between $Equity\ Issue$ ($Debt\ Issue$) and $FLOW$. Other control variables include the firm size, book-to-market ratio, cumulative stock return, average share turnover, idiosyncratic return volatility (based on the Carhart four-factor model), institutional ownership, all measured in year t-1. The sample period is from 1980 to 2009. Standard errors, shown in parentheses, are adjusted for Newey-West corrections with 12 lags. ***, **, and * indicate a two-tailed test significance level of less than 1%, 5%, and 10%, respectively.

	Dependent Variable: Monthly Stock Returns in Year t						
*100	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$FLOW_{t-2}$	-0.47***			-0.36**	-0.35*	-0.42**	-0.33*
	(0.17)			(0.17)	(0.20)	(0.19)	(0.20)
$Equity\ Issue_{t-1}$		-1.05***		-0.97***	-1.06***		-1.03***
		(0.37)		(0.37)	(0.39)		(0.39)
$Debt\ Issue_{t-1}$			-1.96***	-1.89***		-1.92***	-1.88***
			(0.24)	(0.24)		(0.27)	(0.28)
$Equity\ Issue_{t-1}$					-2.05**		-2.05**
$X\ FLOW_{t-2}$					(0.90)		(0.94)
$Debt\ Issue_{t-1}$						-1.58*	-1.49
$X\ FLOW_{t-2}$						(0.91)	(0.94)
Controls	YES	YES	YES	YES	YES	YES	YES
Number of Months	360	360	360	360	360	360	360
Adjusted R^2	0.04	0.04	0.04	0.04	0.04	0.04	0.04

Appendix: Main Variables Definitions and Data Sources

This table describes the definition of the main variables used in this study, followed by the data sources. When possible, the data items or mnemonics are provided as well.

Variable Name	Variable Definition	Data Source
FLOW	Mutual fund flow-induced price pressure. See the data section for the construction of the variable.	CRSP, CDA/Spectrum 13F, and MFLINK
Bond Yield Spread	Corporate bond's yield computed from the trade price minus the corresponding duration matched treasure yield.	FISD, NAIC transaction files, TRACE, and CRSP Treasure files
Issue Size	The issue size of the bond.	FISD
Duration	The duration of the bond.	FISD
Expected Default Frequencies (EDF)	The expected default frequency computed and calibrated to actual defaults by the Moody's KMV. See Crosbie and Bohn (2003) for details.	Moody's KMV
Idiosyncratic Volatility	Residual standard deviations estimated using the Carhart four-factor model, based on daily stock returns over the past one year.	CRSP
Profitability	Operating Income Before Depreciation (t) / Total Assets (t-1).	COMPUSTAT
Tangibility	[PPENT(t) + INVT (t)]/AT(t-1)	COMPUSTAT
Size	The total dollar value of sales divided by aggregated sales across all firms in the same year reported in COMPUSTAT.	COMPUSTAT
Leverage Ratio	Leverage Ratio = [DLTT(t) + DLC(t)]/[DLTT(t) + DLC (t) + BE(t)]	COMPUSTAT
Leverage Gap	Leverage Gap = Estimated long-term leverage ratio − Current leverage ratio, following the procedure in Fama and French (2002).	COMPUSTAT
BE	Book value of equity, BE(t) = total assets (AT) − liabilities (LT) + balance sheet deferred taxes and investment tax credit (if available) (TXDITC) − preferred stock	COMPUSTAT
Book Value of Preferred Stock	The book value of preferred stock is computed as preferred stock's liquidation value (PSTKL) if available, else redemption value (PSTKRV) if available, else carrying value (PSTK).	COMPUSTAT
ME	Market value of equity, ME(t) = SHROUT * PRC	CRSP
B/M	Market value of equity (BE) / book value of equity (ME)	CRSP/ COMPUSTAT
Equity Issuance	We consider two definitions of equity issuance. In the first definition, following Baker, Stein, and Wurgler (2003), Equity Issuance = [CEQ(t) − CEQ(t-1)] + [TXDB(t) − TXDB(t-1)] − [RE(t) − RE(t-1)], normalized by total assets (AT) at the beginning of fiscal year (t-1). In the second definition, following Fama and French (2002), Equity Issuance = SSTK (t) − PRSTKC (t), normalized by	COMPUSTAT

	total assets at the beginning of fiscal year (t-1).	
Short-Term Debt Issuance	Following Baker, Greenwood, and Wurgler (2003), short-term debt issuance is defined as note payable (NP), normalized by total assets (AT) at the beginning of fiscal year (t-1).	COMPUSTAT
Long-Term Debt Issuance	Following Baker, Greenwood, and Wurgler (2002), long-term debt issuance is defined as change in the level of long-term debt (DLTT(t) – DLTT(t-1)) plus debt due in one year (DD1(t) – DD1(t-1)), normalized by total assets at the beginning of fiscal year (t-1).	COMPUSTAT
Total Debt Issuance	Total debt issuance = short-term debt issuance + long-term debt issuance	COMPUSTAT
Capital Expenditure	CAPX(t), normalized by total assets (AT) at the beginning of fiscal year (t-1).	COMPUSTAT
Acquisition	ACQ(t) from the statement of cash flows (SCF), normalized by total assets (AT) at the beginning of fiscal year (t-1).	COMPUSTAT
Net Cash Flow of Financing	FINCF(t) from the statement of cash flows (SCF), normalized by total assets (AT) at the beginning of fiscal year (t-1).	COMPUSTAT
Net Cash Flow of Investment	IVNCF(t) from the statement of cash flows (SCF), normalized by total assets (AT) at the beginning of fiscal year (t-1).	COMPUSTAT
Seasoned Equity Offering Decision	A binary variable takes the value of one if the firm issues equity in the secondary market during quarter (q)	Security Data Corporation
Seasoned Equity Offering Amount	The dollar value of seasoned equity offerings, normalized by the most recent fiscal year's total asset (AT) before the equity offering.	Security Data Corporate/ CRSP
Bond Issuance Decision	A binary variable takes value of one if the firm issues bond on the secondary market during quarter (q).	Security Data Corporation
Bond Issuance Amount	The dollar value of bond offerings, normalized by the most recent fiscal year's total asset (AT) before the bond offering.	Security Data Corporate/ CRSP
Term Spreads	The difference between ten-year treasury yield and three-month treasury yield.	Federal Reserve
Default Spreads	The difference between the Moody's BAA corporate bond index yield and Moody's AAA corporate bond index yield.	Federal Reserve
CFNAIC	Chicago Fed National Activity Index	Federal Reserve Bank of Chicago