Institutional Investors, Credit Supply Uncertainty, and the Leverage of the Firm*

Massimo Massa
INSEAD

Ayako Yasuda
The Wharton School

Lei Zhang
INSEAD

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Abstract: We examine the effects of institutional investors' credit supply uncertainty (CSU) on the capital structure of the firm using a novel dataset. We measure CSU as the investors' investment horizon, based on the idea that the shorter the investment horizon of investors, the higher the issuer's refinancing risk, i.e., the risk of not being able to roll over its maturing debt because of supply uncertainty. We find that high CSU leads to lower leverage and lower probability of issuing bonds in the next period, but to higher probability of issuing equity and borrowing from banks. The effects are concentrated in firms whose bond investor base is more prone to credit supply imbalances, as measured by investor geographical concentration, herding propensity, and local bond preference. These findings suggest that the financial fragility arising from supply-based factors significantly affects the firm's capital structure.

JEL classification: G1, G2

Keywords: supply-based financial fragility; credit market segmentation; corporate bonds; corporate finance; capital structure

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I. Introduction

In the standard theory of corporate finance, supply conditions in the credit markets have traditionally not been considered as prominent determinants of the firm's financing decisions and resulting capital structure of the firm. Instead, the theory has been primarily demand-driven: in trade-off theory, firms choose the optimal debt-equity ratio such that the marginal tax benefit of issuing one more unit of debt equals the marginal cost of debt (in the form of increased cost of distress and bankruptcy). In the pecking-order theory, firms raise external funds by choosing the instrument that is the most advantageous given the information asymmetry the firm faces.

More recently, this demand-centric approach to understand capital structure has been called into question. Baker and Wurgler (2002) argue that capital structure is the cumulative outcome of a series of financing decisions in which managers take advantage of temporary market misevaluations, while Welch (2004) argues that managers fail to counteract the mechanistic effects of stock returns on their capital structure and therefore capital structure is almost entirely determined by lagged stock returns. These contributions only focus on the equity/debt choice, implicitly assuming a perfect substitutability between different sources of debt.

However, in cases in which different sources of debt are not perfect substitutes, any variation in credit supply conditions affecting one of them (e.g., the public bond market) will affect the overall leverage. One source of such variation in credit supply conditions is the firm's bond refinancing risk. For example, suppose that firm A issues a bond and that this is held by more "stable" investors – i.e., investors who are more likely to stay invested in the market for the long-run. In this case, when firm A's debt matures and the firm needs to refinance it, current owners of the maturing debt will be likely to be able to roll over the existing debt. Now, suppose that firm B is identical to firm A in all demand-side characteristics but that its bond is held by less stable investors – i.e., investors who are less likely to be in the market for the long run. In this case, there is a higher probability that the current investors' supply of credit deviates from the amount that firm B needs to refinance its debt when the existing debt matures. That is, there may be supply-induced reasons that generate an imbalance in the credit supply.

To further motivate the concept of bond refinancing risk, consider the following scenario. Many of these investors are institutional investors (e.g., bond funds) who face withdrawal risks, and their investment and divestment decisions may be highly correlated with each other if, for example, there is geographic home bias in bond ownership. Whether these bond funds stay in the market for the long haul depends on the withdrawals they face from their end-investors and on the probability that, in meeting these withdrawals, they are subject to a coordination issue with other fellow institutional investors. That is, if sales from some investors operating in a market niche are foreseen by other market participants, they may preempt the sales by selling themselves, generating a run on the assets in that specific niche.[1] This would reduce the stability of the asset prices and generate an imbalance of credit supply. Such an imbalance of credit supply due to turnover is further amplified if the current investors' purchase and divestment decisions have high correlations, since they are more likely to end up on the same side of the trades. Thus, higher turnover makes refinancing of the bond riskier for firm B relative to firm A. We call this effect of turnover the (supply-based) refinancing risk, which is a type of credit supply uncertainty.

If there is a variation in the bond refinancing risk among firms that have access to bond markets, how do firms respond to this factor? In particular, many firms mix bonds and bank loans in their capital structure. On the one hand, if substitution is perfect and cost-free, an increase in the bond refinancing risk that does not affect supply conditions in bank loan markets should be perfectly cushioned by the firm's ability to substitute toward bank loan markets. On the other hand, if substitution is less than perfect, either because bank loans are more expensive than bond financing or because banks ration the amount of loans they provide a given borrower, then an increase in the bond refinancing risk may result in less than perfect substitution towards loan markets, thus reducing leverage of the firm. In addition, if firms substitute toward equity financing in response to the increase in the bond refinancing risk, then this would further reduce leverage.

These observations raise the following questions: Does bond refinancing risk affect the firm's decision to substitute for issuing bonds by borrowing from banks? Does it also affect its decision to issue equity? If so, how much do firms substitute away from bonds and towards bank loans and equity when bond refinancing risk increases? Do these substitutions have a net effect on the firm's leverage? Do substitution patterns vary for issuers with exclusive relationships with banks (as opposed to those without)? Does bond refinancing risk affect the firm's choice of debt maturity? We investigate these questions and provide new empirical evidence using a novel dataset.

In particular, we study:

[1] Prior studies, such as Bernardo and Welch (2004) and Chen, Goldstein, and Jiang (2007), have analyzed this type of runs on financial markets based on self-fulfilling beliefs. For studies of runs based on self-fulfilling beliefs and strategic complementarities in other contexts of financial systems, see, for example, Diamond and Dybvig (1983) (for bank-runs) and Morris and Shin (1998) (for currency market attacks).

1. Whether the (supply-based) bond refinancing risk affects the firm's choice of substitutions between three sources of external financing (bonds, bank loans, and equity).
2. How these substitution patterns vary with respect to the degree to which the current investors' investment and divestment decisions are correlated.
3. What is the net effect of the bond refinancing risk on the firm's leverage and how this effect varies with respect to the correlation in investment patterns among the current bond investors.
4. Whether the substitutability between bonds and bank loans varies for issuers that maintain exclusive bank relationships, as opposed to those that do not have exclusive bank relationships.
5. Whether the bond refinancing risk affects the firm's choice debt maturity.

Our main data source is the eMAXX fixed income database by Lipper. Using this novel dataset, we construct a measure of turnover for each bond issuer's investor base in each quarter. The measure is based on the idea that investor base with higher turnover, ceteris paribus, exposes issuers to higher refinancing risk (the risk of not being able to roll over its debt in the next period). We also construct other attributes of issuers' investor base, such as geographical concentration, home-state bias, and herding propensity, each of which is designed to capture the investors' propensity to have a credit supply imbalance as a group. The rationale here is as follows: the higher the correlation in investment patterns among a given bond's investors, the more amplified the risk of potential imbalance in credit supply that is induced by a given level of turnover.

The findings indicate that the supply-based bond refinancing risk is very important in determining the firm's financing decisions and capital structure. First, we find that the bond refinancing risk has negative and significant effects on the firm's probability of issuing bonds, after controlling for an exhaustive list of firm characteristics (both financial and operational). In contrast, the bond refinancing risk has positive and significant effects on the firm's probability of issuing equity and borrowing from banks. This suggests that firms respond to adverse changes in credit supply conditions in the bond market by substituting away from bonds and into equity and bank loans.

Second, in subsample analyses we find that these substitution effects are concentrated in firms whose bond investor base exhibits high correlations in their investment patterns, as measured by geographical concentration, local home bias, and herding propensity. In contrast, for firms that have a more diverse investor base, investors that are not concentrated in the firm's home state, and investors who are not prone to herding, bond turnover has no significant effect on their financing decisions. This result supports our view that the turnover captures a type of credit supply risk that is amplified when the firm's investors are likely to end up on the same sides of trades, because it increases the probability that the firm is unable to refinance a maturing bond. Thus, firms that are susceptible to this amplification avoids exposure to rising risk by refraining from issuing bonds and substituting towards issuing equity and borrowing from banks.

Third, we find that the bond turnover has significant and negative net effects on both market and book leverage. This corroborates the incremental financing decision results, which indicate that when the bond refinancing risk increases, firms issue fewer bonds, borrow more from banks, and issue more equity. We document that this net effect on leverage is indeed quite robust and long lasting; it is present whether we use market leverage or book leverage as the dependent variable, and whether we use simple or dynamic leverage adjustment model. Consistent with the second finding, we also document that the leverage effect is concentrated for firms whose investor base exhibits high correlations in their investment patterns. To the best of our knowledge, this is the first paper to identify and demonstrate the supply-based bond refinancing risk as a significant determinant of firms' capital structure.

Fourth, we find that the positive effect of bond refinancing risk on the firm's propensity to borrow from banks disappears when issuing firms maintain exclusive bank relationships. In other words, firms that maintain exclusive bank relationships do not substitute between bonds and bank loans in response to fluctuations in bond turnover; only firms that maintain arm's length bank relationships do. We separately document that these relationship firms unconditionally rely more on bank loans than others. A plausible interpretation of these results is that relationship firms are on average closer to their maximum credit ceiling from banks and have little or no room to substitute, whereas arm's length firms are less constrained.

Finally, we document that the bond refinancing risk affects the firms' choice of debt maturity. Namely, conditional on issuing a bond, an increase in long-term bond turnover is associated with a decrease in the bond maturity. In contrast, conditional on borrowing from a bank, an increase in long-term bond turnover is associated with an increase in the loan maturity. These findings are consistent with the view that firms respond to an increase in long-term bond turnover by substituting into both short-term bonds and long-term loans.

Our findings relate to several strands of literature. First, there is the vast literature on capital structure, which hithertofore has mostly focused on the equity/debt rebalancing choice (e.g., Myers, 1977, 1984; Myers and Majluf, 1984; Titman and Wessels, 1988; Shyam-Sunder and Myers, 1999; Frank and Goyal, 2003; Fama and French, 2002, 2003; Leary and Roberts, 2005). We contribute to this literature by showing how lack of perfect substitutability between bonds and bank loans directly affects leverage. Similar to Welch (2004), Baker, Ruback, and Wurgler (2004), and Baker and Wurgler (2000, 2002), we argue that today's leverage is the cumulative outcome of a series of prior decisions. However, unlike Welch (2004), we find that managers adjust their capital structure in response to credit-supply conditions.

One paper particularly close in motivation to ours is Faulkender and Petersen (2005). They find that firms that have access to the public bond markets have significantly more leverage. Their findings suggest that supply conditions that determine the firm's ability to increase its leverage are binding constraints for some firms, and thus have significant explanatory power. While their work compares firms with and without access to public bond markets, it is possible that even within firms with access to public bond markets, conditions they face in the bond markets vary significantly, both across firms and across time, and thus affecting their choice of external financing and capital structure. Our paper focuses on this variation within firms with access to the public bond market and shows that indeed supply conditions matter in explaining these firms' capital structure.

Second, our findings add to the literature on the determinants of the firm's choice of type of debt (e.g., Diamond, 1984; James, 1987; James and Wier, 1988; Diamond, 1991; Rajan, 1992; Houston and James, 1996; Cantillo and Wright, 2000; Hovakimian, Opler, and Titman, 2001; Denis and Mihov, 2004) and that on the firm's debt maturity choice (e.g., Bolton and Scharfstein, 1996). We contribute here by identifying a hitherto overlooked supply-side condition that affects both the firm's debt and well as maturity choice.

Third, this paper provides one of the first evidence on the impact that potential liquidity and financial market runs have on the capital structure of the firm. The theoretical literature has identified the possibility of bank runs (Diamond and Dybvig, 1983), financial market runs (Bernardo and Welch, 2004; Chen, Goldstein, and Jiang, 2007), as well as currency attacks (Morris and Shin, 1998) that are based on self-fulfilling beliefs. Intuitively, when agents' payoffs exhibit complementarities (as they do for bank depositors and mutual fund investors), decisions of other agents to withdraw first hurt the payoffs of those who remain, thus exacerbating the negative price impact of runs.[2] We contribute to this literature by directly linking the *possibility* of a financial market run on the bonds of a firm to its bond refinancing risk and examining how

[2] More recently Diamond (2004) links debt maturity and enforcement costs: potential runs on firms are seen as an indirect way of enforcing discipline upon the managers of the firm.

this risk affects the firm's financing choice and its leverage. On the empirical front, Chen, Goldstein, and Jiang (2007) test the implication of a model of financial market runs using equity mutual fund data and find that funds holding illiquid assets experience greater outflows after poor performance. Their results suggest that the costly forced liquidation of assets (upon investor withdrawals) does subject mutual fund investors to this risk of belief-based runs, which is in support of our empirical approach. Their paper does not examine how the risk of financial market runs affects the capital structure of the firm. Also, while their work focuses on the risk that the individual fund investors face and respond to, our paper focuses on the bond refinancing risk that issuer firms face and respond to as a result of interactions between the institutional investors holding the firm's bonds.

Fourth, the paper relates to the literature on the nature and duration of relationships between firms and creditors and how changes in conditions of creditors' health and/or industry competitive environment affect credit pricing and availability of funds to borrowers. The literature has mostly focused on bank-firm relationships and banking industry structure (e.g., Boot, and Thakor, 2000; Berger and Udell, 1995, 1996, 2002; Petersen and Rajan, 1994; Petersen and Rajan, 1995; Yasuda, 2005, 2007). In contrast, relatively little is known about how distributions of bondholders and changes in their investment patterns affect credit supply conditions to borrowers, mostly due to data limitations. This paper aims to fill this gap using a database of quarterly institutional bond holdings, which to the best of our knowledge has not been examined before. We show that stability of the firm's bond investor base has direct and long-lasting impacts on the firm's capital structure. Furthermore, we document that exclusive bank-firm relationships effectively segment the credit market and further reduce the substitutability between bonds and bank loans.

It is worth stressing that our sample consists only of firms with access to public bond markets, which are generally perceived as the least credit-constrained. So it is all the more remarkable that even for this sample of firms, we find that there is significant variation in credit supply uncertainty and that firms respond to these changes in credit supply conditions by substituting across bond and equity and also bond and bank loans. Indeed, if the firm is initially at its optimal capital structure, the firm pays a price of deviating from its optimum by increasing equity issuance and decreasing issuance of bonds. The fact that firms do so suggests that bond markets and bank loan markets are segmented and substituting between the two debt instruments is not frictionless.[3] Interestingly, for firms with exclusive bank relationships, we observe that

[3] See Lemmon and Roberts (2007) for a related study examining how shocks to the supply of credit impact corporate

there is no substitution. A plausible explanation for this is that banks ration credit supply to firms and these firms are already at / near the maximum. This is consistent with the earlier findings of Faulkender and Petersen (2005) in that these firms represent a transitional group, i.e., a group between firms with no access to bond markets (and thus with low leverage) and firms whose primary source of debt is bond markets.

The rest of the paper is organized as follows. Section II details our research questions and empirical approach. Section III discusses the data and presents summary statistics. Section IV and V present the main empirical results. Section VI concludes.

II. Research Questions and the Empirical Approach

One feature of bond financing that makes it distinct from equity financing is the need for refinancing. Unlike equity, bonds eventually mature, and firms often need to issue new debt in order to repay the maturing bond. When firms have difficulty refinancing the debt, this may hinder the firm's ability to access the bond markets. Furthermore, if variation in refinancing risk across firms exists that is not related to the firms' relative benefits and costs of debt (i.e., demand factors), then this supply factor may affect the firm's incremental financing decisions and hence its capital structure.

We start by defining a variable that proxies for supply-induced bond refinancing risk: turnover. This variable measures the investment horizon of the bond's investors and therefore their potential inability to let the firm refinance the bond. As an illustrative example, suppose that firm A issues a bond and it is held by investors with low turnover.   Since these investors are less likely to be subject to sudden liquidity needs (for example due to early withdrawals), when the bond matures and the firm needs to refinance it, current owners of the maturing bond are likely to be able to roll over the debt. Now suppose that firm B is identical to firm A in all *demand-side* characteristics but that its bonds are held by investors with high turnover. High turnover implies that investors may be forced to sell (for example due to early redemption needs) at the very same time the firm wants to roll over its debt. That is, high turnover implies a higher probability that the current investors' supply of credit deviates from the amount that firm B needs to refinance its debt when the debt matures, ceteris paribus.

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financing and investment.

This tendency to have an imbalance of credit supply due to turnover is further amplified if the current investors' purchase and divestment decisions have high (positive) correlations with each other, since they are more likely to end up on the same side of the trades. Many of these investors are institutional investors (e.g., bond funds) that face withdrawal risks and their investment and divestment decisions may be highly correlated if, for example, there is geographic concentration or investor herding. Thus, higher turnover makes refinancing of the bond riskier for firm B relative to firm A. We call this effect of turnover the (supply-based) refinancing risk, which is a type of credit supply uncertainty.

If bond turnover indeed captures this supply-based bond refinancing risk and the firm's financing decision is affected by the level of this risk, we would expect firm B to be less likely to issue a bond relative to firm A, ceteris paribus. Moreover, if the bond refinancing risk prevents firm B from issuing bonds, what other courses of action can the firm take to finance its projects? It can either (1) issue equity or (2) borrow from banks.[4] Thus, relative to firm A, we would expect firm B to be more likely to borrow from banks and/or issue equity. These predictions form our first main hypothesis on the *substitution effect of the bond refinancing risk on the firm's financing decisions in bond, equity, and bank loan markets*.

H1a: Higher bond refinancing risk induces a shift from bond-finance to bank- and equity-finance.

To test this hypothesis, we examine the firm's incremental financing decision using a probit model. The baseline model follows the following specification:

$$Bond\ Issue\ Choice_{i,t} = \beta' X_{i,t-1} + Turnover_{i,t-1}\delta_{bond} + \varepsilon_{i,t}, \qquad (1)$$

where the dummy dependent variable takes the value of one if the issuer i issues a bond in the quarter t, and zero otherwise; $X_{i,t-1}$ is a matrix of firm and bond characteristics that affect the firm i's demand for debt/bonds in period t; $Turnover_{i,t-1}$ is the measure of average turnover for bond portfolios held by firm i's investors in the previous four quarters; and $\varepsilon_{i,t}$ is the error term that is assumed to be distributed normal. Eq. (1) represents the baseline model for the firm's bond issuance decisions; for the firm's bank loan decisions and equity issuance decisions, we replace the dependent variable with corresponding bank borrowing dummy variable and equity issuance dummy variable, respectively. In Section IV. *A.4*, we also combine these separate incremental issuance decision analysis in a multinomial logit model setup.

[4] We do not consider trade credit as source of financing in this paper (see Fisman and Love, 2003; Cunat, 2007). We consider CP financing as one form of public debt financing and examine this in Section IV *A.3* of the paper.

One concern with this empirical approach is that our key variable of interest, the bond turnover, may proxy for some unobserved firm characteristics that affect the benefits and costs of debt (i.e., demand factors) for the firm. If higher turnover proxies for higher cost of financial distress, for example, then this lowers the firm's demand for debt, and hence we would observe a lower incidence of bond issuance, but this would not be a result of supply conditions in the bond market affecting the firm's financing decisions.

We address this concern in four ways. First, we include as many observable demand factors as control variables ($X_{i,t}$ in Eq. (1)) as possible. Second, we examine the firm's bond financing decisions and bank borrowing decisions separately. If turnover purely captures factors affecting demand for debt, we should see equally negative effects on the firm's bond issuance and bank borrowing decisions. If, however, bond turnover captures the bond refinancing risk as we posit, then the effect of turnover on bank borrowing decision should be positive. Thus the sign of the coefficient on turnover in the bank borrowing decision model helps us distinguish between the two cases.

Third, we carefully choose the way in which the turnover measure is constructed to further alleviate the concern that it picks up any firm-specific characteristics that affects the firm's demand for debt. Namely, we first measure it as an investor attribute at the institutional investor level *using all the bonds held by the investor, not just the bond in question,* and then aggregate the measures thus constructed across all the investors who own the bond. Thus, it is unlikely that a change in some unobserved characteristics of a single firm has a significant impact on this measure.

Finally, we examine how the effect of turnover on the firm's financing decisions varies with the degree to which the investors' investment and divestment decisions are (positively) correlated. Intuitively, high turnover increases the probability that there is an imbalance in credit supply when the firm needs to refinance its bond, ceteris paribus. Since both purchases and divestments contribute to turnover, this imbalance risk is amplified when investors are likely to trade on the same side at the same time. In contrast, if the trades always balance each other out, then high turnover itself does not increase the bond refinancing risk for the issuing firm (since the investors as a group always supply the same amount of capital). Thus, we can demonstrate whether the turnover truly captures the supply-side effect (and not the unobserved demand-side effect) by comparing groups of firms for which this amplification risk is greatest versus others who face little or no such risk. We do this by conducting a series of subsample analyses.

As an example of subsample-forming criteria, consider the degree of herding by the bond investors. If the firm's bond holdings consist of investors who herd more with each other (i.e., they trade more on the same side at the same time), the firm is more likely to experience an imbalance in credit supply. Having more of the firm's debt held by investors who tend to herd with each other does not, in and of itself, affect the firm's demand for debt. Thus, if turnover captures the demand-side factor, its effect on the firm's financing decisions should be the same whether the firm has high- or low-herding investor base for its bonds. But having high-herding investor base would, ceteris paribus, amplify the risk that there is an imbalance of credit supply for the firm for a given level of turnover. Suppose, for example, that there is a negative economic shock that induces capital outflows from institutional bond investors. As these investors herd and sell their bonds at the same time, the firm faces a credit imbalance.

Similarly, consider a case in which the firm's bond holdings consist of investors who are geographically more concentrated. As the literature as shown (e.g., Hong, Kubik and Stein, 2005), institutional investors tend to invest in the same assets if they are located close to each other. While having more of the firm's debt held by investors who invest in similar bonds in and of itself does not affect the firm's demand for debt, it amplifies the risk that there is an imbalance of credit supply for the firm in the presence of capital outflows from institutional bond investors as these investors' divestment decisions will be more highly correlated. Finally, if the firm's bond holdings consist mostly of local investors, such an investor base is more subject to local shocks and is more likely to generate an imbalance.

We therefore predict that the effect of turnover on the firm's financing decisions is stronger for subsamples of firms whose investor base is most susceptible to the imbalance in credit supply due to high turnover.

H1b: The sensitivity of the firm's financing decisions to bond refinancing risk is higher the more likely a credit imbalance is.

Another concern about our use of turnover as a measure of bond refinancing risk is that it might instead proxy for bond liquidity. Ceteris paribus, the more liquid the bond, the more likely the firm is to issue public debt. Note that, because the sign on liquidity is predicted to be the opposite of that on bond refinancing risk, having this confounding factor biases our coefficient on turnover towards zero in each of the firm's financing decision equations. As comprehensive bond trading data are not available due to opaqueness of corporate bond markets, we are not able to directly construct bond-specific liquidity measures. Instead, we include the fraction of institutional ownership of bonds as our proxy of bond liquidity measure in the regressions. To the extent that our measure of bond liquidity is a noisy proxy, it makes our turnover results weaker, not stronger.

To the extent that firms respond to the rise in the bond refinancing risk by substituting between bond, equity, and bank loans, what is the net effect of the bond refinancing risk on the firm's leverage? There are two reasons to expect the net effect to be negative. First, the equilibrium level of substitution between bank loans and bonds may be less than perfect. On the price side, the literature suggests that bank loans are more expensive than bond financing due to the cost of delegated monitoring (Diamond, 1991). Furthermore, on the quantity side, banks may ration the amount of loans they provide to a given borrower (Petersen and Rajan, 1994, 1995). If either mechanism is at work, an increase in the bond refinancing risk may result in less than 1-to-1 substitution towards loan markets, which implies reduction in leverage. Second, to the extent that firms have relatively cheap access to equity financing, there may be an optimal level of substitution toward equity when the bond refinancing risk rises, further reducing the leverage. This leads to our second main hypothesis that links *turnover* and the firm's leverage.

H2a: Increase in the bond refinancing risk negatively affects the firm's leverage.

To test this hypothesis, we examine the determinants of the firm's leverage using a firm fixed-effect regression approach. The baseline model follows the following specification:

$$Leverage_{i,t} = \alpha_i + \beta' X_{i,t-1} + Turnover_{i,t-1}\delta_{leverage} + \varepsilon_{i,t}, \qquad (2)$$

where $Leverage_{i,t}$ is a measure of firm i's leverage at period t; α_i is the firm fixed effect; and $X_{i,t-1}$ and $Tuvnover_{i,t-1}$ are as defined before. We employ several alternative measures of leverage to test the robustness of our results. In addition, we employ an alternative measure of turnover that weighs each of the previous period s's turnover by the amount of external financing conducted in period s (as opposed to equal-weighting).

One concern of the above model is that firms may adjust leverage dynamically. To address this concern, we also estimate the firm's dynamic leverage adjustment model, specified as follows:

$$\begin{aligned} &Change\ in\ leverage_{i,t} = \alpha_i + Target\ leverage\ adjustment_{i,t}\omega + \beta' X_{i,t-1} \\ &+ Turnover\ shock_{i,t-1}\delta_{leverage} + \varepsilon_{i,t}, \end{aligned} \qquad (3)$$

where $Change\ in\ leverage_{i,t}$ is the change in leverage from period *t-1* to *t*; $Target\ leverage\ adjustment_{i,t}$ is the predicted adjustment in leverage (defined as the difference between the expected level of leverage at *t* and the actual level of leverage at *t-1*); $\text{Turnover shock}_{i,t-1}$ is the unexpected component of the bond refinancing risk (defined as the difference between the predicted and actual realized turnover); and all other variables are as defined before.

To alleviate the concern that the bond turnover may inadvertently capture demand-side factors rather than credit supply uncertainty, we also test the leverage hypothesis separately for different subsamples using the investors' susceptibility to credit supply imbalance as subsample-splitting criteria. If the turnover captures the demand-side factors, its net effect on the firm's leverage should not differ between these subsamples. In contrast, if the turnover captures the supply-side bond refinancing risk as we posit, then we predict that the negative effect of turnover on the firm's leverage is stronger for firms for which the current investors are most susceptible to credit supply imbalance.

H2b: The sensitivity of the firm's leverage to bond refinancing risk is higher the more likely a credit imbalance is.

Next, what constrains the ability of firms to substitute towards bank loans when the bond refinancing risk is high? We posit that, all else equal, firms that already rely on bank lending and are in exclusive bank relationships are more constrained than non bank-dependent firms in their ability to substitute between bonds and bank loans. Intuitively, substitution is possible only if the firm is not already at or near the corner solution. Firms that repeatedly borrow from the same bank are more likely to be near their maximum credit capacity from relationship lending. The literature documents that banks often ration the quantity of credit supply to their customer firms. Thus, we predict that the positive effect of bond turnover on the firm's bank borrowing decision is weaker for firms that are in exclusive bank relationships relative to firms that do not maintain exclusive bank relationships

H3: The sensitivity of the firm's decision to borrow from a bank to bond financing risk decreases for firms with a close bank-firm relationship.

To test this hypothesis, we modify Eq. (1) as follows:

$$Bank\ borrowing\ Choice_{i,t} = \beta' X_{i,t-1} + Turnover_{i,t-1}\delta_{bank} + Turnover_{i,t-1} * Relationship_{i,t}\omega_1 + Relationship_{i,t}\omega_2 + \varepsilon_{i,t},$$

(4)

where $Relationship_{i,t}$ is a dummy variable taking the value of one if firm i has completed a relationship-lending deal (defined as a deal in which at least one of the lead arrangers has lent to the borrower in the three years prior to the deal date) in the past five years and zero otherwise[5]; and $Turnover_{i,t-1} * Relationship_{i,t}$, our key variable of interest, is an interactive variable between the relationship variable and the turnover variable. We expect this coefficient to be negative, such that the positive effect of turnover on the firm's bank borrowing decision is more muted for firms with exclusive bank relationships, all else equal.

Next, we examine the firm's debt maturity choice. As in the literature examining the determinants of the firm's capital structure, this literature has so far focused almost exclusively on the demand-side (i.e., firm-specific) determinants of maturity, such as risk, information asymmetry, tax considerations, etc. We posit that the supply-side bond refinancing risk is an additional determinant of the firm's choice of debt maturity. The intuition is as follows: if the bond turnover is high in the long-term bond category, this makes refinancing of long-term bonds riskier than otherwise. Firms would respond to this higher risk by refraining from issuing long-term bonds. In place of issuing long-term bonds, what do they do in order to finance their projects? We examine what happens in the cases of increases in both short-term and long-term bond turnover.

Let us start with am increase in the long-term bond turnover. We consider two directions of substitutions. First, *conditional on the firm deciding to issue a bond*, we predict that the firms respond to the increase in long-term bond turnover by shortening the maturity of the bond they issue. This captures the idea that, if the firm remains in the bond market, it avoids the risky long-term category by issuing a short-term bond. Second, *conditional on the firm deciding to borrow from a bank,* we predict that the firms respond to the increase in long-term bond turnover by lengthening the maturity of the loan they take. This captures the idea that, if the firm substitutes away from the bond market altogether and borrows from a bank instead, it increases its propensity to take a long-term loan, which is a closer substitute to a long-term bond than a short-

[5] Bharath, Dahiya, Saunders, and Srinivasan (2007) use a similar measure of relationship lending.

term loan. We know from the literature that bonds have longer maturities than private debt in general.[6] Therefore, to the extent that a new bank loan is taken out to substitute for a bond due to an increase in bond refinancing risk, the maturity of the loan should be longer than otherwise.

For an increase in the short-term bond turnover, we predict that, *conditional on the firm deciding to issue a bond*, the firms respond by lengthening the maturity of the bond. *Conditional on the firm deciding to borrow from a bank*, the prediction is somewhat ambiguous. On the one hand, an increase in the short-term turnover increases the firm's propensity to take a short-term loan, which is a closer substitute than a long-term loan. On the other hand, given that bank loans are generally shorter in maturity to begin with, substituting away from short-term bonds into short-term loans may not affect the maturity of the new loan.

H4a: Conditional of issuing a bond, an increase in the short-term (long-term) bond refinancing risk lengthens (shortens) the bond maturity.

H4b: Conditional of borrowing from a bank, an increase in the short-term (long-term) bond refinancing risk shortens (lengthens) the loan maturity.

To test these hypotheses, we examine the firm's debt maturity decision using a tobit model. The baseline model is specified as follows:

$$Maturity_i = \beta' X_i + Long\text{-}term\ turnover_i \delta_{long} + Short\text{-}term\ turnover_i \delta_{short} + \varepsilon_i \quad (5)$$

$Maturity_i$ is the maturity of the bond or bank loan *i*; X_i is the control firm characteristics, measured in the fiscal period immediately prior to the debt issue date; $Long\text{-}term\ turnover_i$ is the turnover of long-term bonds, measured in the period immediately prior to the debt issue date; and $Short\text{-}term\ turnover_i$ is similarly defined. We separately estimate tobit models for a sample of bond issues and a sample of bank loans.

Finally, Faulkender and Petersen (2005) document that firms without a bond rating (their measure of access to credit supply) are more credit-constrained than firms with a rating. Their analysis focuses on the difference in leverage between firms with and without access to the bond market, while the focus of our analysis is the variation in credit supply uncertainty among those

[6] For example, Guedes and Opler (1996) report that the mean maturity of corporate bonds in their sample is 12 years; in contrast, Berger, Espinosa-Vega, Frame, and Miller (2005) report that the mean maturity of loans in their sample is less than 2 years.

firms with access to the bond market, and how this variation drives the firm's financing decisions and leverage. For a more credit-constrained firm, it is more painful / costly to be exposed to the bond refinancing risk, because if they are unable to refinance in the next period, they will have to give up valuable investment opportunities. Following the literature, we use the payout ratio as a measure of credit constraint and examine the effect of turnover on the firm's financing decisions (as in Eq. (1)) and leverage (as in Eq. (2) and (3)) separately for constrained and non-constrained groups. In line with Acharya, Almeida and Campello (2007), we expect the firm's financing decision to be related to its financial constraints. The more financially constrained the firm is, the more it cannot afford to take refinancing risk. This leads to our last hypothesis:

H5: The impact of refinancing risk on the firm's financing decisions as well as on its leverage is stronger the more financially constrained the firm is.

To summarize, we test the following hypotheses:

1. How does bond turnover affect the firm's decision to issue bonds, equity, and borrow from banks? This is captured by the coefficient δ in Eq. (1).
2. Does the effect of turnover on the firm's financing decisions depend on the susceptibility of the investor base to credit supply imbalance? This is captured by estimating Eq. (1) for different subsamples (such as high-herding vs. low-herding).
3. How does bond turnover affect the firm's leverage? This is captured by the coefficient $\delta_{leverage}$ in Eq. (2) and (3).
4. Does the effect of turnover on the firm's leverage depend on the susceptibility of the investor base to credit supply imbalance? This is captured by estimating Eq. (2) and (3) for different subsamples (such as high-herding vs. low-herding).
5. Does the effect of turnover on the firm's decision to borrow from a bank depend on the exclusivity of the firm's bank relationships? This is captured by the coefficient ω_1 in Eq. (4).
6. Does turnover affect the firms' choice of debt maturity? This is captured by the coefficients δ_{long} and δ_{short} in Eq. (5).
7. Does the effect of turnover on the firm's financing decisions and leverage depend on the credit-constraint of the firm? This is captured by estimating Eq. (1) -(3) for high- and low-payout ratio groups.

III. Data, Construction of Main Variables and Summary Statistics

We construct our data set from multiple sources. In order to construct our main variable, bond turnover, we use Lipper's eMAXX fixed income database. It contains details of fixed income holdings for nearly 20,000 U.S. and European insurance companies, U.S., Canadian and European mutual funds, and leading U.S. public pension funds. It provides information on quarterly ownership of more than 40,000 fixed-come issuers with \$5.4 trillion in total fixed income par amount from the first quarter of 1998 to the second quarter of 2005.

We approximate credit supply uncertainty by measuring the historical trading horizon of investors holding corporate bonds. By definition, a short-term investor buys and sells his investments frequently, while a long-term investor holds its positions unchanged for a longer period of time. This implies that, ceteris paribus, bond issues held primarily by short-term investors are more likely to experience credit supply imbalances and thus bear more supply uncertainty in the bond market than the issues held mainly by long-term investors. To implement this idea empirically, we calculate for each institutional investor a measure of how frequently he rotates his positions on all the bond issues in his portfolio ("churn rate"). It is measured as the aggregate purchases and sales of bonds divided by the average of bond holdings. If we denote the set of bond issues held by investor j by Q_j, the churn rate of investor j at quarter t is:

$$CR_{j,t} = \frac{\sum_{i=1}^{Q_j} \left| V_{i,j,t} - V_{i,j,t-1}(1 + R_{i,t}) \right|}{\sum_{i=1}^{Q_j} \frac{V_{i,j,t} + V_{i,j,t-1}}{2}}, \quad (6)$$

where $R_{i,t}$ and $V_{i,j,t}$ represent the total return and the par amount of bond issue i held by investor j at quarter t. This definition follows those commonly used to assess overall equity portfolio rotation (Carhart (1997), Barber and Odean (2000)). In each quarter we exclude investors entering the sample for the first time since they will automatically have a churn rate of 2. The data on bond holdings are directly obtained from Lipper. The returns data are obtained from Bloomberg. If the return of a particular bond issue is missing, we replace it with the median return of similar bonds with the same maturity and credit ratings.

Next, we use individual investors' churn rates to construct a measure of bond refinancing risk for each bond issuer. Let S_i denote the set of investors which own bond issue i, and let $w_{i,j,t}$ denote the weight of investor j's holding in the total percentage of bond i held by institutional investors at quarter t. The turnover of bond issue i is the weighted average of the total portfolio churn rates of its investors over the previous four quarters:

$$Turnover_{i,t} = \sum_{j \in S_i} w_{i,j,t} \left(\frac{1}{4} \sum_{r=1}^{4} CR_{j,t-r+1} \right). \qquad (7)$$

If there are multiple outstanding bond issues for a firm in a given quarter, we use the median value to proxy for the firm's general bond investor turnover.

Next, we merge the turnover data with the CRSP/Compustat database. We only include firms with complete information on bond turnover and book assets for at least 5 years during the period from 1998 to 2005. We exclude financial firms with an SIC code between 6000 and 6999, firms with a book asset value of less than \$10 million, firms with market-to-book ratio larger than 10, and firms with market leverage or book leverage greater than 1. Our primary sample consists of 4,563 firm-year observations.

Our sample of public bond and equity issues is drawn from the SDC global new issues database for the years 1999-2005. SDC collects new issues data from SEC filings, prospectuses, news sources, wires, and daily surveys of underwriters and financial contacts. We obtain individual loan-transaction data from Loan Pricing Corporation (LPC)'s Dealscan database for the years 1999-2005. This database has become a primary source of loan data and has been used in many studies. We select only completed and confirmed transactions. The majority of these deals consist of term loans and revolving lines (about 75% of the sample). Nearly 20% of the sample is 364-day facilities; importantly, most of them are used to back up the issuance of commercial paper (i.e., LPC reports the primary purpose of these loans as CP backup). We refer to this type of deals as the CP backup line of credit and distinguish them from the rest of the deals. For each given year we match the SDC data with our primary sample using the issuer's CUSIP number. We merge the LPC data with our primary sample by the borrower's ticker and name.

Since our main focus is on the choice of financing, we make use of the following convention during the merging process: we require the firm-year proceeds to be at least \$10 million for each type of financing; if one firm has multiple deals of the same type in a year, we aggregate the issuance amount and treat them as a single observation. In this way we have 600 firm-year observations for bond issues, 341 firm-year observations for equity issues, 362 firm-year observations for CP backup line of credit, and 1,124 firm-year observations for bank borrowing.[7]

Using this merged dataset, we construct a number of firm characteristics which we use as control variables in our regressions. *Bond flow*$_i$ equals the percentage change in the level of institutional investors' holdings of bonds issued by firm *i*. *Bond holding fraction*$_i$ equals the sum of holdings of firm *i*'s bonds by all the institutional investors included in the Lipper database divided by firm *i*'s total debt outstanding. *Stock turnover*, *stock flow,* and *stock holding fraction* are similarly defined and are constructed using the CDA/Spectrum Mutual Fund Holdings database. The other firm-specific control variables include *abnormal return*, *Amihud's illiquidity, stock return volatility, asset tangibility, asset size*, *profitability*, *R&D expenditure, Altman's z-score*, *asset maturity*, *capital* expenditure, *market-to-book ratio*, and *industry-average book leverage*. The construction of these variables is described in detail in the Appendix.

As described in the hypothesis section, we estimate our models for different subsamples based on the level of home area investor ownership, the degree of investor herding, the level of investor geographical clustering, and the level of payout ratio (i.e., the level of financial constraint). *Home area (investor) ownership*$_{i,t}$ equals the percentage of firm *i*'s bond issues owned by the home area investors (Coval and Moskowitz, 1999, 2001*).*[8] *Investor herding* is defined as in Lakonishok, Shleifer and Vishny (1992). It reflects the degree of institutional investors following each other into (out of) the same bonds over some period of time. *Investor geographical clustering* captures the geographical location structure of institutional bond investors. High level of (*investor) geographical clustering*$_{i,t}$ means that firm *i*'s bonds are held by geographically closely located investors in period *t*. *Payout ratio* is defined by purchases of common and preferred stock plus dividends divided by operating income before depreciation. The detailed procedure for calculating those variables is provided in the Appendix.

Descriptive statistics are reported in Table I. The mean bond refinancing risk (bond turnover), averaged over the 4,563 firm-year observations, is 0.31, which is much lower than the mean stock turnover (0.68). This suggests that on average bond institutional investors are longer-term investors than equity institutional investors. While the mean is low, this measure has a

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[7] If the firm taps multiple security types in a given period (e.g., firm A issues a bond *and* borrow from a bank), we count that firm-year as both a bond-issuance observation *and* a bank-borrowing observation. The results are robust to dropping these firm-years in which the firm taps multiple security types from our analysis; in fact, the results actually become stronger, which is consistent with these observations being noisier ones.

[8] To define home areas, we divide the 50 U.S. states into seven areas (area1 (Northwest), area2 (West), area3 (Midwest), area4 (the Gulf states), area5 (East), area6 (South), and area7 (Hawaii and Alaska)) and create a dummy variable for each one of them (*location dummies*).

much higher standard deviation (0.15) than the stock turnover (0.06). The mean bond holdings fraction (bonds held by institutional investors divided by corporate debt) is 0.33; while this may appear low, note that the denominator of this variable is the total outstanding debt and thus includes bank loans and other types of debt other than bonds. The fraction of bonds held by institutional investors is thus considerably higher than this percentage. The mean market and book leverage is 0.33 and 0.32, respectively. The mean bond maturity (averaged over the 947 bond issues in the sample) is 10.14 years, in contrast to the mean bank loan maturity (averaged over the 1,309 bank loans in the sample) of 3.5 years.[9] The shorter maturity of loans relative to bonds is consistent with previous findings reported in the literature.

Do bond investors tend to own bonds issued by local firms and herd each other on these local firms' bonds more? In other words, is there home bias in bond ownership and is there more herding for local firm bonds? In Table II, we examine these questions and report statistics on investors' ownership and herding of home area bond issues. The purpose of this analysis is twofold. First, these questions have not been examined before due to data limitations. Second, the investors' local investing patterns can illuminate whether our subsample criteria can indeed capture the likelihood of credit imbalances as we posit.

Using the seven home area dummies as defined above, we first calculate the fraction of bond issues owned by the home area investors. We use a raw ownership measure as well as a relative (excess) ownership measure proposed by Coval and Moskowitz (2001) which is defined as the difference between the home area raw ownership and the fraction that would be held by home area investors under the assumption that each investor holds the market portfolio. In other words, *local ownership* measures the degree of home bias in ownership.

The results are reported in Panel A. First, home area bond investors hold on average 33% to 38% of the firm's bonds. Second, this is on average 14% to 15% in excess of what they should hold, if they were to hold the market portfolio. The *t*-statistics and the Wilcoxon rank-sum test statistics indicate that the excess holding is significantly different from zero. The results indicate that within each home area the investors tend to invest more in the bonds of firms within the same area than in bonds of firms located out of that area. This is important as it provides the first of the two building blocks we use to motivate our subsample criteria.

[9] Note that the numbers of bond issues and bank loans reported here for the purpose of calculating average maturities are larger than the number of firm-years in which we report positive incidence of bond issuance and bank loans. This is because some firms issue multiple bonds (or receive multiple bank loans) in a given year.

Next, we calculate the degree of herding of home area and non-home area bond issues using the notion of herding proposed by Grinblatt, Titman and Wermers (1995). Our empirical measure of institutional investor herding at the firm level is based on the methodology used by Lakonishok, Shleifer and Vishny (1992) as well as Wermers (1999). The construction of the measure is described in detail in the Appendix.

In Panel B, we report statistics on (i) the degree by which home area investors herd with other home area investors on home area bonds and (ii) the degree by which non-home area investors herd with other non-home area investors on home area bonds. Note that if only 1 investor owns a given bond in a given area, by definition that investor cannot herd because it lacks company. Thus we need to impose a minimum number of investors holding a given bond in a given area in order to meaningfully construct the herding measures. We use three cutoff levels: 3, 5, and 10. As expected, the higher the cutoff number, the higher the herding measure we report. As shown in the first column, home area investors herd with each other (0.109-0.172). Non-home area investors also herd with each other (0.092-0.129), but the *t*-statistics and the Wilcoxon rank-sum test statistics indicate that home area investors herd significantly more than the non-home area investors. This result provides the second building block, i.e., within each home area investors trade on the same side more of the time when buying and selling their local area bonds.

Though not central to our questions, we also note that bond institutional investors in general herd much more with each other than equity institutional investors. For example, Lakonishok, Shleifer, and Vishny (1992) report that the mean level of herding by equity institutional investors in their sample is 2-3%. In comparison, our sample bond investors herd by 9-17%. To the best of our knowledge this high level of bond investor herding has not been documented before.

Finally, in Panel C, we show that our subsample criteria indeed capture the higher likelihood of buy-sell trade imbalances. We define the *buy-sell trade imbalance*$_{i,t}$ for firm *i*'s bond at period *t* as the difference between the sum of (the absolute values of) net position changes for buyer investors and seller investors divided by the total holdings of the bond by institutional investors. Intuitively, it captures how much net excess buying or net excess selling the firm's bond experiences as a fraction of the total bond issues held by institutional investors. The higher the fraction, the riskier refinancing the bond would be, ceteris paribus. We report the average level of the buy-sell trade imbalance for each of our subsamples as discussed in Section II. The results indicate that the trade imbalance is statistically significantly higher when (i) there is more local ownership, (ii) investors are clustered geographically closer, and (iii) they tend to herd more.

The findings are consistent with the notion that, for issuers with these types of investor bases, there is a higher chance that the amount of credit provided by their existing investors deviates from the amount that the firm needs to refinance its debt when the existing debt matures. These findings allow us to use these three dimensions – local ownership, investors herding and investor geo-clustering – as measures of higher likelihood of credit supply imbalance. Separately, we also report that the trade imbalance is statistically significantly higher when the firm's payout ratio is lower.

IV. The Firm's Financing Choice Model

We start our analysis with the firm's financing choice model, studying whether the bond refinancing risk affects the way the firm approaches the bond market, the equity market, or banks. Then, we focus on the maturity of the debt and examine its relation with the bond refinancing risk.

A. The Choice of the Instrument: bond, equity, or bank loan financing?

To finance projects using externally raised funds, the firm can approach the bond market, the equity market, or banks. As described in Section II, we posit that the bond refinancing risk should affect the firm's incremental financing choices. In particular, a higher bond refinancing risk should increase the incentive to issue equity or to resort to bank borrowing, while reducing the desire to issue bonds. Moreover, the sensitivity of the firm's choice to the bond refinancing risk is predicted to be higher when credit imbalances are more likely. To test these hypotheses (*H1a and H1b*), we first estimate a series of binary probit models of the firm's issuance choices, examining one instrument at a time. Then, we estimate a multinomial choice model where the firm chooses one instrument out of many.

A.1. The Probability of Issuing Bonds

We start with the firm's probability of issuing bonds. We estimate a binary probit model in which the dependent variable is a dummy taking the value of 1 if the firm is a new bond issuer in year *t* and 0 otherwise. We model the firm's decision to issue bonds as a function of the bond turnover (our measure of bond refinancing risk) and a set of control variables.

Our control variables in the regressions are as follows: *Bond flow*, *bond holding fraction*, *stock turnover*, *stock flow, stock holding fraction, abnormal return*, *Amihud's illiquidity, stock* *return volatility, asset tangibility, asset size*, *profitability*, *R&D expenditure, Altman's z-score*, *asset maturity*, *capital* expenditure, *market-to-book ratio*, and *industry-average book leverage*. All the variables are measured as lagged values from the previous year. Construction of these variables is described in detail in the Appendix.

We also include a set of dummy variables as additional control variables. *Firm's credit quality* is defined by Standard and Poor's long-term domestic issuer credit rating (data280) which represents a current opinion on an issuer's overall capacity to pay its financial obligations (Standard and Poor's (2001)). We further synthesize this rating into ten rating categories (AAA, AA, A, BBB, BB, B, CCC, CC, C, NR) and create a dummy variable for each one of them (*credit rating dummies*). We also include year dummies, industry dummies, and location dummies (the latter is based on the seven home areas as described in Section III).

The results are reported in Table III. In column (1), the model does not include industry dummies but the errors are clustered at the two-digit SIC-code industry level. In column (2), the model includes two-digit SIC industry dummies and the errors are clustered at the firm level. These two columns form our baseline models to test our first hypothesis (*H1a)*, i.e., the bond refinancing risk reduces the firm's probability of issuing bonds. In columns (3)-(8), we present the results of the model for various subsamples to test our second hypothesis (*H1b*), namely that the sensitivity of the firm's choice to issue bonds is higher the more likely a credit imbalance is. In columns (9)-(10), we examine our fifth hypothesis (*H5*), i.e., the sensitivity of the firm's choice to issue bonds is higher the more financially constrained the firm is. All of the specifications include year dummies, location dummies and credit rating dummies.[10]

First, the results in columns (1)-(2) indicate that there is a strong negative relation between the firm's decision to issue bonds and the bond refinancing risk that the firm faces. This holds across the different specifications and for different controls. The results are not only statistically significant but also economically significant. An increase of one standard deviation in the bond refinancing risk reduces the probability of issuing bonds by 22%. This is in support of our first hypothesis (*H1a*) and shows that the higher bond refinancing risk induces a shift away from bond finance. The signs of other control variables are largely as expected: firms that have high stock turnover, high stock return volatility, or short distance to financial distress are less likely to issue a bond, whereas firms that experience high abnormal return, or have large asset size,

[10] We do not include macroeconomic variables in our regressions since they will be captured by these dummy variables.

high asset tangibility, high capital expenditure, or high book leverage are more likely to tap the bond market.

The coefficient on the *bond holding fraction*, our proxy for bond liquidity, is negative and coefficient, which is somewhat surprising. Recall that the less bank loans the firm has, the larger this measure would be, since its denominator is the firm's total debt outstanding. Thus, it is possible that this measure picks up the amount of slack the firm has in its bank borrowing capacity and thus causing its coefficient to be negative in the bond issuance decision model. To the extent that this is a noisy measure, the coefficient on our variable of interest, the bond turnover, is biased towards zero; thus our current estimate of -0.79 to -0.83 is likely an underestimate of the true effect of bond refinancing risk on the firm's propensity to issue a bond.

Second, the results in columns (3)-(8) indicate that this effect of the bond turnover on the firm's bond issuance choice is concentrated in firms that are likely to experience credit supply imbalances, i.e., firms with high local ownership (column (3)), firms whose investors tend to herd more (column (5)), and firms whose investors are located close to each other (column (7)). These results strongly support *H1b* (the sensitivity of the firm's financing decisions to bond refinancing risk is higher the more likely an imbalance is), which in turn alleviate the concern that the results of the baseline model (columns (1)-(2)) could be driven by some unobserved firm-specific demand factors that are correlated with the bond turnover.

Finally, the results in columns (9)-(10) show that the negative effect of the bond turnover on the firm's bond issuance choice is concentrated in firms that are more financially constrained, i.e., firms with low payout ratio. This supports *H5* and the view that the more financially constrained the firm is, the less it can afford to take refinancing risk and thus the more it substitutes between instruments in order to avoid the risk. This is consistent with others' findings on the relation between financial constraints and corporate hedging behavior (e.g., Acharya, Almeida and Campello (2007)).

A.2. The Probability of Issuing Equity

Next, we consider the firm's choice of issuing equity. The model specification and the list of control variables are the same as in the bond issuance model. The results are reported in Table IV. First, the results reported in columns (1)-(2) show a strong positive relation between the decision to issue equity and the bond refinancing risk that the firm faces. The higher the uncertainty in the bond market, the more the firm targets the equity market. This result is robust to alternative model specifications for fixed effects and error-clustering choices. It is also economically significant. An increase of one standard deviation in the bond market refinancing risk increases the probability of issuing equity by 17%. Together with the findings in columns (1)-(2) of Table III, this is in support of our first hypothesis (*H1a*) and shows that an increase in the bond refinancing risk induces a substitution away from bond finance toward equity finance.

The signs of other control variables are as expected but are also different from those reported in Table III in meaningful ways: firms that have high stock illiquidity, high profitability (and thus more retained earnings), or short distance to financial distress are less likely to issue equity, whereas firms that experience high stock flow or high abnormal return, or have large asset size, high asset tangibility, high capital expenditure, high market-to-book ratio, or high book leverage are more likely to tap the equity market. The coefficient on the bond holding fraction is again negative and significant, which is consistent with the interpretation that this measure picks up the amount of slack the firm has in its bank borrowing capacity and thus causing its coefficient to be negative in the equity issuance decision model. Also, it is interesting that the coefficient on the bond flow is not significant from zero in the bond issuance model (shown in Table III), whereas the coefficient on the equity flow is positive and marginally significant in Table IV. This suggests that firms takes advantage of investor inflows into funds holding their equity by issuing new equity, while they refrain from timing the market in analogous ways when it comes to the bond market. A crucial difference between equity and bonds is that a bond matures and often needs to be refinanced. Thus, firms have additional incentives not to issue bonds when there is a surge of flows into funds holding their existing bonds, if they expect them to experience just as sudden outflows in the future.

Next, we estimate one of the baseline models (the same specification as column (2)) using our subsamples, as shown in columns (3)-(8). Again, the results are consistent with *H1b*, i.e., the firm's sensitivity of the firm's financing decisions to bond refinancing risk is higher the more likely a credit imbalance is. In fact, we find that for firms with low local ownership (column (4)), low degree of investor herding (column (6)), and with low level of geographical clustering (column (6)), the bond turnover has no effect on their choice of equity issuance. Further, we document that the bond turnover has no effect on the choice of equity issuance for firms with high payout ratio (column (9)). These results are consistent with the previous findings on the decision to issue bonds (Table III) and with *H1b* and *H5*.

Together, the results in Table III and IV suggest that there is substitutability between bond and equity and that the bond refinancing risk changes the trade-off on preferring one market to the other. Is the substitutability between bonds and bank loans complete or just partial? We address this issue by examining the net effect of the bond refinancing risk on leverage in Section *IV. B*.

A.3. The Probability of Borrowing from Banks

Finally, we examine the firm's decision to borrow from banks. We model the firm's choice of borrowing from banks as a function of the bond refinancing risk and a set of control variables. We obtain the bank loan data from LPC DealScan database from 1999 to 2005, as described in Section III.[11] Banks frequently serve as providers of insurance to CP-issuing firms by providing what is known as the CP backup line of credit (Gatev and Strahan, 2006). Since we wish to analyze the substitution between the firm's decisions to issue public debt vs. the decisions to borrow from banks, incidence of a CP backup line of credit in a given year should not be coded as a decision to borrow from banks; rather, it should be coded as a decision to issue CP, a type of public debt. We therefore drop from our sample of bank loans those 364-day facilities that list CP backup line of credit as their primary purpose. This gives us a sample of 1,124 bank loan deals out of 4,563 firm-year observations. We separately examine the CP backup line of credit sample in Panel D of Table V.

Table III and IV show that firms which experience high bond turnover shift away from bond finance into equity finance. These findings raise the question, why don't firms simply substitute away from bonds into bank loans, so as to not change the debt/equity ratio? In equilibrium, partial substitution toward bank loan financing may occur either because some firms prefer equity financing to bank borrowing, or because banks do not supply enough credit to allow some firms to fully substitute, or both. To explore the latter explanation further, we posit that, all else equal, firms that already rely on bank lending and are in exclusive bank relationships are more constrained than non bank-dependent firms in their ability to substitute between bonds and bank loans. Intuitively, substitution is possible only if the firm is not already at or near the corner solution. Firms that repeatedly borrow from the same bank are more likely to be near their maximum credit capacity from relationship lending. Thus, we predict that the positive effect of bond turnover on the firm's bank borrowing decision is weaker for firms that are in exclusive bank relationships relative to firms that do not maintain exclusive bank relationships. To test this hypothesis (*H3*), we use a modified model specification (Eq. (4)) as described in Section II for the bank borrowing choice model.

[11] We require the total deal amount to be at least 10 million dollars for each firm-year. If a firm has multiple deals in a year, we treat them as one observation. We only include completed and confirmed deals.

The results of the baseline models are reported in Panel A. In column (1), we reproduce the original baseline model specification as in Eq. (1). The coefficient on the bond turnover is not significantly different from zero, indicating that there is no substitution between bonds and bank loans in response to an increase in the bond turnover. This specification, however, restricts all firms to respond to fluctuations in the bond turnover in the same way. In contrast, in column (2) we allow firms with and without exclusive bank relationships to respond differently, as in Eq. (4). The coefficient on the interaction term is negative and significant, whereas the coefficient on the bond refinancing risk is now positive and significant. The *p*-value for the hypothesis that the sum of the two coefficients equals zero is 0.2775. Thus, this specification reveals interesting differences between the two types of firms: Firms *without* exclusive bank relationships respond to an increase in the bond refinancing risk by substituting toward bank loans, whereas firms *with* exclusive bank relationships do not. For the former type of firms, one standard deviation increase in the bond refinancing risk raises the probability of borrowing from banks by 9%. These results are consistent with our hypotheses *H1a* and *H3*.

What is the reason for this difference? The coefficient on the relationship dummy is positive and significant, indicating that firms with exclusive bank relationships are more frequent borrowers than firms without exclusive relationships. Taken together, these results are consistent with the view that relationship firms are on average closer to their maximum credit ceiling from banks and have little or no room to substitute, whereas non-relationship firms are less constrained in this way.

In columns (3)-(10), we present the results of testing hypotheses *H1b* and *H5* using subsamples. Consistent with our predictions, we find that the positive effect of the bond refinancing risk on the firm's bank borrowing choice is concentrated in subsamples with (i) high local ownership, (ii) high herding, (iii) high investor geo-clustering, or (iv) low payout ratio.

One issue in comparing the choice of issuing bonds and that of borrowing from banks is the asymmetry in maturity. In general, bonds are issued at longer maturities than bank loans. To the extent that short-term loans are poorer substitutes for bonds than long-term loans, we confound our analysis by including short-term loans in our sample. Therefore, in order to make bank borrowing and bond issuing more comparable, we consider two alternative specifications. First, we estimate a model specification in which the dependent variable is a dummy taking a value of 1 if the firm is borrowing from a bank with debt maturity longer than 3 years during a year and 0 otherwise (i.e., we only count those bank loans with maturity of equal to or greater than 3 years as incidences of bank borrowing). The rest of the specification is the same as in Table III and IV (i.e., we estimate Eq. (1), not Eq. (4)).

The results are reported in Panel B. Here, we see a strong positive relationship between the probability of bank borrowing and the refinancing risk in the bond market. In particular, a one standard deviation increase in the refinancing risk raises the probability of borrowing from banks by 14%. The subsample results, reported in columns (3)-(10), are qualitatively similar to the previous results reported in Table III, IV, and Panel A of Table V. Taken together, the results in Panel A and Panel B suggest that firms prefer to substitute for bonds with loans with similar maturity, i.e., the substitution effect of the bond refinancing risk could affect the firm's choice of maturity in a given debt instrument segment. We examine this question further in Section *IV.B.*

The signs of other control variables in Panels A and B are largely consistent with the theory: firms that experience high stock flow, or have high R&D expenditures or short distance to financial distress are less likely to borrow from banks, whereas firms that have high abnormal return, large asset size, or high profitability are more likely to borrow from banks. The negative and significant coefficient on the R&D expenditure in particular is interesting: one interpretation is that firms that engage heavily in R&D are risky firms that prefer arm's length financing to bank financing (e.g., Rajan (1992)).

As a second alternative specification, we restrict our analysis to those cases in which the firm raises long-term debt (i.e., >= 3 years in maturity) in a given period and examine the firm's choice of public bond versus bank loans. The dependent variable is equal to 1 if it is a bank loan and 0 if it is a bond issue.

The results are reported in Panel C. First, the full-sample results shown in columns (1)-(2) show a strong positive relationship between the bond refinancing risk and bank borrowing. In particular, a one standard deviation increase in refinancing risk raises the probability of borrowing from banks as opposed to issuing bonds by 11%. The subsample results, reported in columns (3)-(10), are qualitatively similar to the previous panels, i.e., only firms with higher likelihood of credit imbalances (or higher level of financial constraint) respond to an increase in the bond refinancing risk by substituting away from bond markets and toward bank loans.

The signs of other control variables are quite interesting. Larger firms are more likely to issue bonds than borrow from banks, which is consistent with Diamond (1991) which argues that firms with higher reputation and longer credit history (both of which are picked up by the firm size) do not need bank monitoring and prefer cheaper bond finance. High R&D firms are more likely to issue bonds than borrow from banks, which is again consistent with Rajan (1992). Firms with high stock return volatility are less likely to issue bonds than borrow from banks, which is consistent with the negative coefficient on stock return volatility in the bond issuance choice model in Table III (in contrast, the coefficient on stock return volatility is not significantly different from zero in the bank loan choice model in Panel A of Table V). The coefficient on the bond holding fraction is marginally positive, which is consistent with the interpretation that this measure picks up the amount of slack the firm has in its bank borrowing capacity and thus causing its coefficient to be positive in the bank loan/bond choice model.

Finally, we turn to the firm's choice of obtaining CP backup line of credit from banks. These lines of credits are used to provide liquidity insurance in case the firm is unable to refinance its CP upon maturity. Since CPs are a form of public debt, to the extent that our measure of the bond refinancing risk captures the firm's risk of refinancing its CP, we posit that the effect of the bond refinancing risk on the firm's probability of issuing CP is negative (*H1a)*. Though we do not directly observe the firm's choice of CP issuance, we use the CP backup line of credit as a proxy for CP issuance (the logic being that firms obtain CP backup line of credit only when they issue CP) and estimate Eq. (1) as it applies to the firm's choice of issuing CP. The dependent variable is a dummy taking a value of 1 if the firm is acquiring a CP backup line of credit during a year and 0 otherwise.

The results are reported in Panel D. There is a strong negative relationship between the bond refinancing risk and CP backup line of credit. In particular, one standard deviation increase in refinancing risk reduces the probability of getting a CP backup line of credit by 61%. Again, the subsample results, reported in columns (3)-(10), are qualitatively similar to the previous panels, i.e., only firms with higher likelihood of credit imbalances (or higher level of financial constraint) respond to an increase in the bond refinancing risk by substituting away from CP markets.

To conclude, the overall results reported in Table V strongly support *H1, H3,* and *H5*. There is substitutability between bond and bank loans and the bond refinancing risk changes the trade-off on preferring one market to the other. Importantly, this substitution between bonds and bank loans disappears for firms with exclusive bank relationships. As in subsections *IV.A.1-2,* the effect of the bond refinancing risk is also concentrated in firms with high likelihood of credit imbalances. Finally, we document that the substitution effect is significant only for financially constrained firms.

A.4. A Multinomial Choice Framework

So far, in subsections *IV.A.1-3,* we examine the firm's choice of external financing one instrument at a time (bond, equity, bank loans, and CP). As a robustness check, we also estimate a multinomial logit choice model in which the firm chooses one instrument out of several. In particular, we employ a multinomial logit specification in which we regress the firm's financing decisions on the refinancing risk in the bond market as well as a set of control variables. The firm's choices consist of (1) CP (backup line of credit), (2) bond, (3) equity, (4) bank loan, and (5) no external financing in a given period. To make bank borrowing and bond issuing more comparable, we only include bank loans with maturity longer than 3 years. We require the total deal amount of each type to be at least $10 million to be included for each firm-year. If a firm issues the same type of securities multiple times in a year, we treat them as one observation. The explanatory variables are the same as in the previous specifications and are lagged values measured in the previous year. All of the specifications include year dummies, location dummies and credit rating dummies.

The results are reported in Table VI. Note that, since the control variables as well as the bond refinancing risk are chooser-specific (and not choice-specific) variables, the coefficients are estimated separately for each choice. The coefficients for one choice (in this case the choice of no external financing) are normalized to 0. Columns (1)-(4) report results for one of the two specifications where the errors are clustered at the industry level. Columns (5)-(8) reports results for the second specification where industry dummies (2-digit SIC codes) are included and the errors are clustered at the firm level. Comparisons of the two specifications indicate that the results are robust to alternative fixed effects and error clustering choices.

First, the coefficients on the bond refinancing risk corroborate the binary probit model results reported in Table III-V and are consistent with *H1a*: An increase in the bond refinancing risk reduces the probability that the firm issues public debt (CP or bonds) and increases the probability that it issues equity or borrows from banks. Second, the signs of coefficients on control variables are largely consistent with the binary probit results, which is reassuring.

Interestingly, rather than substituting entirely with bank loans, firms compensate for the reduction in public debt issuance by both increasing equity finance and bank borrowing. The split appears to be roughly equal between equity and bank loans for average firms in the sample. The fact that the corresponding increase in the incidence of bank borrowing does not fully match the decrease in the incidence of debt issuance, coupled with the fact that there is a corresponding increase in the incidence of equity financing, points to the possibility that there is a net negative effect of the bond refinancing risk on the firm's leverage. However, note that we only measure *incidence* of financing and not the net amount of funds raised in this framework. Thus, we revisit this question when we directly examine the effect of the bond refinancing risk on leverage in Section *V*.

B. The Choice of Debt Maturity

In this section we consider the firm's choice of debt maturity. We estimate a series of tobit models of bond and bank loan maturities on the bond refinancing risk and a set of control variables. To test our hypothesis *H4* we construct two different measures of refinancing risk based on the maturity of the debt: the long-term bond refinancing risk and the short-term bond refinancing risk. Since not all firms have both long and short-term bonds outstanding in a given period, we are not able to construct these maturity-specific bond-refinancing risks at the firm level. Instead, we calculate the value-weighted average of bond turnover across all the institutional investors with holdings in each rating-maturity level. "Short-term bond refinancing risk" is the median (across maturity levels) of these category-specific turnovers for bonds with maturity less than 3 years for each rating category from AAA to NR. "Long-term bond refinancing risk" is the median (across maturity levels) of these turnovers for bonds with maturity longer than 5 years for each rating category. To address the potential endogeneity of debt instrument choice, we run an (unreported) first-stage regression of bank loan vs. bond binary probit choice model and include the inverse Mill's ratio (Heckman's lambda) in the second-stage regression. Thus, the second-stage equation is

$$Maturity_i = \beta' X_i + Long\text{ - }term\ turnover_i \delta_{long} + Short\text{ - }term\ turnover_i \delta_{short} + \lambda_i \phi + \varepsilon_i \quad (7)$$

where λ_i refers to the Heckman's lambda constructed from the first-stage regression. Other than this term, this equation is identical to Eq. (5). Since the dependent variable, maturity, is left-censored at 0, we employ a tobit model to estimate Eq. (7).

The results are reported in Table VII. Panel A (columns (1)-(6)) reports the maturity choice model estimation results for the bond issue sample; Panel B (columns (7)-(12)) reports the maturity choice estimation results for the bank loan sample. In columns (1) and (7), only the long-term bond refinancing risk is included. In contrast, in columns (2) and (8), both the long-term and short-term bond refinancing risk are included. Columns (3)-(6) and (9)-(12) present the subsample results as before.

The results show that an increase in the long-term bond refinancing risk shortens the maturity of bonds issued whereas it lengthens the maturity of bank loans borrowed. The results are not only statistically significant, but also economically relevant: An increase of one standard deviation in the long-term bond refinancing risk shorten the bond maturity by 16% and lengthens the loan maturity by 11%. The larger magnitude of the turnover coefficient in the bond sample (Panel A) is consistent with the generally longer maturity of bonds relative to bank loans (see Table I): there is a wider range of maturity to choose from when the firm considers the optimal maturity length for a bond. In contrast, an increase in the short-term bond refinancing risk only affects the maturity of bonds significantly, whereas its effect on the bank loan maturity is not significantly different from zero. As in the previous specifications, the impact of the bond refinancing risk on the maturity is stronger for firms with higher likelihood of credit imbalances---i.e., firms with higher local ownership and higher herding.

The signs of the control variables are interesting. Firms with higher stock return volatility (a measure of risk) and shorter distance to financial distress issue shorter-maturity bonds, whereas firms with higher asset tangibility or larger firm size issue longer-maturity bonds. In the bank loan sample, firms with high profitability and higher book leverage borrow at longer maturity, whereas high R&D firms borrow at shorter maturity. These results suggest that better credit quality (in a sense of lower default and higher loss recovery rate) is generally associated with longer maturity in the sample. Somewhat surprisingly, higher institutional holding ratio in the stock market is positively associated with loan maturity, whereas asset maturity is negatively associated with it.

To summarize, the results of the debt maturity choice model estimations are generally consistent with hypotheses *H4a* and *H4b*. Of the short- term and long-term bond refinancing risk, the long-term bond refinancing risk dominates in determining the firm's choice of maturity in both the bond and the bank loan market. The signs of the effects are opposite in the two markets, which suggests that when the long-term bond refinancing risk increases, the firm avoids the risk either by issuing short-term bonds (thus shortening the maturity of bonds issued) or by borrowing from banks at long maturity (thus lengthening the maturity of the loans taken).

V. The Credit Supply Uncertainty and the Firm's Capital Structure

Having examined in detail the effects of the credit supply uncertainty on the firm's incremental financing decisions, we now turn to our second central question, i.e., the effect of the credit supply uncertainty on the firm's leverage. If there were no market frictions and perfect substitutability among the different forms of debt financing, we should observe no direct impact on leverage. However, the analyses in Section IV reveal that firms do not completely substitute for reduction in bond financing (as a result of an increase in the bond refinancing risk) with a corresponding increase in bank borrowing. Rather, firms appear to use a mix of equity financing and bank borrowing to finance projects when they are unable to issue bonds due to high bond turnover. This raises the question of whether the net effect of the bond refinancing risk on the leverage is indeed negative.

A. The (Static) Impact of Turnover on Leverage

To study the relationship between the bond refinancing risk and leverage, we consider two alternative specifications. The first specification is the regression of the firm's leverage on the bond refinancing risk and a set of control variables, as in Eq. (2). We consider both book leverage and market leverage.

The results are reported in Table VIII, Panel A for the case of market leverage and in Table IX, Panel A, for the case of book leverage. The results show a strong negative link between leverage and the refinancing risk in the bond market. Firms facing a higher refinancing risk in the bond market have a lower leverage. This holds across different specifications and both for market and book leverage. The results are also economically significant. One standard deviation increase in the bond refinancing risk results in a 4% (2%) reduction in the market (book) leverage. Moreover, the impact of the bond refinancing risk is stronger for firms with higher likelihood of credit imbalances – i.e., with (i) higher local ownership, (ii) higher herding, and (iii) higher geographical clustering. These results are consistent with both *H2a* and *H2b*. In addition, in columns (9)-(10) we document that the impact of the bond refinancing risk on the firm's leverage is concentrated in firms with low payout ratio, which is consistent with *H5*.

While these results are in line with our predictions, the model used may not capture the full impact of the refinancing risk. Namely, the model assumes that the firm fully adjusts each period to the fluctuations in the bond refinancing risk. Instead, today's leverage may be the result of a series of past decisions in which the past levels of refinancing risk played a role. Therefore, following Baker and Wurgler (2002), we define an external finance-weighted bond refinancing risk that allows us to account for the past cumulative effects of refinancing risk on the current level of leverage. In particular, for firm i, we construct a measure of External Finance-weighted Bond Turnover ($EFTurnover_{i,t}$) as:

$$EFTurnover_{i,t} = \sum_{s=0}^{t} \frac{e_s + d_s}{\sum_{r=0}^{t} (e_r + d_r)} Turnover_{i,s}, \quad (8)$$

where e_s and d_s denote net equity and net debt issues during year s. Net debt issue is the change in book assets minus the change in book equity divided by book assets. Net equity issue is the change in book equity minus the change in retained earnings divided by book assets. $Turnover_{i,s}$ is the bond refinancing risk during year *s*. We then use this measure rather than the simple lagged turnover in our second specification.

The results are reported in Table VIII, Panel B for the case of market leverage and in Table IX, Panel B, for the case of book leverage. In column (1), the model does not include industry dummies but the errors are clustered at the two-digit SIC-code industry level. In column (2), the model includes two-digit SIC industry dummies and the errors are clustered at the firm level. These two columns form our baseline models to test our first hypothesis (*H2a)*, i.e., the bond refinancing risk reduces the firm's leverage. As in Panel A, we find a negative relation between current leverage and our measure of external finance-weighted bond turnover. Thus, today's leverage is a function of the bond and equity market conditions in the past. Firms that have experienced periods of high refinancing risk in the bond market (i.e., high bond turnover) in the past have a relatively low leverage today. This result holds across the two specifications. The result is not only statistically significant, but also economically relevant. An increase of one standard deviation in our measure of external finance-weighted bond turnover reduces market (book) leverage by 7% (4%). These findings support *H2a*. Moreover, the impact of refinancing risk is concentrated in subsamples with (i) high local ownership, (ii) high herding, (iii) high investor geo-clustering, and (iv) low payout ratio. These results provide evidence in support of the hypotheses *H2b* and *H5*.

The signs of other control variables in the leverage regressions are qualitatively similar between Panel A and B in both Tables VIII and IX, and are largely as expected. Consistent with firms taking advantage of buoyant stock market conditions by issuing new equity, firms with high levels of stock flow or high abnormal returns have lower leverage, everything else equal. Similarly, firms with high levels of bond flow have higher leverage, though the effect is only marginally significant. Consistent with high profitability causing the market value of stock to rise, firms with high profitability have lower market leverage, but not lower book leverage. On the other hand, consistent with financially troubled firms being shut out of debt markets, firms with shorter distance to financial distress (as measured by Altman's z-score) have lower leverage also.

Also, larger firms and firms with high institutional holding ratio in the stock market have higher leverage. These firm characteristics may proxy for firm risk (or lack thereof). Finally, firms that belong to industries with high leverage (not surprisingly) have higher leverage, all else equal.

B. The Dynamic Impact of Turnover on Leverage

In this subsection we consider a more dynamic specification as a robustness check of our main results reported in Section *V.A*. In particular, we estimate a firm fixed-effect regression of the change in market (book) leverage on the target market (book) leverage adjustments and the firm's capital supply uncertainty shock in the bond market. The goal is to explicitly focus on the adjustment that the firm makes to the shocks coming from the credit supply uncertainty. We define the dependent variable, *leverage* $adjustment_{i,t}$, as firm *i*'s change in market (book) leverage from year *t-1* to year *t*. Our key variable of interest, *bond refinancing risk* $shock_{i,t}$, is defined as the difference between the level of the bond refinancing risk at *t-1* and the expected level of the bond refinancing risk (alto at *t-1)*. The expected level of the bond refinancing risk is estimated as the fitted value of a firm fixed effect regression (unreported) of the bond refinancing risk on its previous value and the set of control variables used in the main specification (e.g., Table VIII). The *target (leverage)* $adjustment_{i,t}$ is defined as the difference between the leverage at time *t-1* and the expected level of leverage at time *t*. The expected level of leverage is constructed as the fitted value of a firm fixed effect regression (unreported) of leverage on the control variables used in the main specification.

The results are reported in Table X, Panel A and B for market and book leverage, respectively. As before, we use two baseline specifications; in column (1), the model does not include industry dummies but the errors are clustered at the two-digit SIC-code industry level, whereas in column (2), the model includes two-digit SIC industry dummies and the errors are clustered at the firm level. Subsample results are shown in columns (3)-(10).

The results show that a positive shock to the bond refinancing risk reduces leverage. A shock equivalent to one standard deviation in the (unexpected) bond refinancing risk reduces the change in market (book) leverage by 2%(2%). As expected, the sign on the target adjustment is positive and significant. Taken together, the results indicate that, over and above the usual dynamic adjustments firms make in order to move toward to the target level of leverage, firms also adjust their current leverage levels in response to the unexpected changes in the bond refinancing risk. Furthermore, the impact of refinancing risk is concentrated in subsamples with

(i) high local ownership, (ii) high herding, (iii) high investor geo-clustering, and (iv) low payout ratio. These results provide further evidence in support of the hypotheses *H2a, H2b*, and *H5*.

VI. Conclusion

We examine the effects of credit supply uncertainty (CSU) in the corporate bond markets on the capital structure of the firm. We measure CSU as the bond turnover rate, based on the idea that the shorter the investment horizon of investors, the higher the issuer's refinancing risk, i.e., the risk of not being able to roll over its maturing debt due to investors' credit supply uncertainty. We find that high CSU leads to lower leverage and lower probability of issuing bonds in the next period. High CSU, on the other hand, increases the firm's probability of issuing equity and borrowing from banks in the next period. Moreover, these effects are concentrated in firms whose bond investor base is more prone to credit supply imbalances, as measured by investor geographical concentration, herding propensity, and local bond preference. These findings suggest that the financial fragility arising from supply-based (as opposed to demand-based) factors have significant effects on the capital structure of the firm. While the positive effect of CSU on bank borrowing implies that issuers can substitute away from bonds into bank loans in times of high CSU, this substitution occurs only for firms whose bank relationships are non-exclusive. In contrast, CSU does not affect bank borrowing decisions of firms with exclusive bank relationships. Together, our findings suggest that credit supply uncertainty in the corporate bond market and segmentation of the credit markets (bonds vs. bank loans) are important drivers of corporate financing policy and capital structure even for established firms with access to public bond markets.

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Appendix: Variable Definitions

Bond turnover

We approximate credit supply uncertainty by measuring the historical trading horizon of investors holding corporate bonds. By definition, a short-term investor buys and sells his investments frequently, while a long-term investor holds its positions unchanged for a longer period of time. This implies that, ceteris paribus, bond issues held primarily by short-term investors are more likely to experience credit supply imbalances and thus bear more supply uncertainty in the bond market than the issues held mainly by long-term investors. To implement this idea empirically, we calculate for each institutional investor a measure of how frequently he rotates his positions on all the bond issues in his portfolio (churn rate). First, let Q_j denote the set of bond issues held by investor j. The churn rate of investor j at quarter t is:

$$CR_{j,t} = \frac{\sum_{i=1}^{Q_j} \left| V_{i,j,t} - V_{i,j,t-1}(1 + R_{i,t}) \right|}{\sum_{i=1}^{Q_j} \frac{V_{i,j,t} + V_{i,j,t-1}}{2}}, \qquad \text{(A1)}$$

where $R_{i,t}$ and $V_{i,j,t}$ represent the return and the par amount of bond issue *i* held by investor *j* at quarter *t*. Next, we use individual investors' churn rates to construct a measure of bond refinancing risk for each bond issuer. Let S_i denote the set of investors which own bond issue *i*, and let $w_{i,j,t}$ denote the weight of investor *j*'s holding in the total percentage of bond *i* held by institutional investors at quarter *t*. The turnover of bond issue *i* is the weighted average of the total portfolio churn rates of its investors over the previous four quarters:

$$Turnover_{i,t} = \sum_{j \in S_i} w_{i,j,t} \left(\frac{1}{4} \sum_{r=1}^{4} CR_{j,t-r+1} \right). \qquad \text{(A2)}$$

Investor Herding

Our measure of institutional investor herding at the firm level is based on the methodology used by Lakonishok, Shleifer and Vishny (1992) as well as Wermers (1999). Let $B_{i,t}$ ($S_{i,t}$) denote the number of investors who buy (sell) bond issue *i* at quarter *t.* Then the herding measure (HM) is expressed as:

$$HM_{i,t} = | p_{i,t} - E[p_{i,t}] | - E | p_{i,t} - E[p_{i,t}] |, \qquad \text{(A3)}$$

where $p_{i,t} = B_{i,t} / (B_{i,t} + S_{i,t})$ is the proportion of all institutional investors trading issue-quarter *i, t* that are buyers. The first term represents the "extra" portion of investors buying a particular bond issue during a given quarter relative to the expected proportion of buyers. We use the proportion of all trades by investors that are purchases during quarter *t* to proxy for $E[p_{i,t}]$. The second term is an adjustment factor allowing for random variation around the expected proportion of buyers under the null hypothesis of cross-sectional independence among trades by institutional investors. The expectation in the second term is calculated by assuming $B_{i,t}$ follows a binomial distribution $B_{i,t} \sim B(n, p)$ with parameters *n* and *p* specified as ($B_{i,t} + S_{i,t}$) and $E[p_{i,t}]$, respectively.

Investor Geographical Clustering

We define our measure of investor geographical clustering using the location structure of institutional bond investors. For investors located in the U.S., the county level coordinates (latitude, longitude) are obtained from Gazetteer Files of Census 2000. The coordinates of investors outside the U.S. are hand-collected from the website http://www.infoplease.com/atlas. We classify all the bond issues into 10 categories according to their S&P bond ratings: AAA, AA, A, BBB, BB, B, CCC, CC, C and NR (not rated). We then apply clustering analysis (Hartigan, 1975) to the set of investors investing in each rating category and partition them into 10 clusters based on their geographical distances from each other. The formula used to calculate the distance between two funds is: $\sqrt{[69.1*(\text{lat2}-\text{lat1})]^2 + [53.0*(\text{lon2}-\text{lon1})]^2}$, where *lat1, lat2, lon1*, and *lon2* are latitude and longitude values in degrees for fund 1 and 2, respectively. The formula provides an approximate distance between two global coordinates (Coval and Moskowitz, 1999 and 2001). For rating category *k* at quarter *t,* let $n^k_{m,t}$ be the number of investors within cluster *m* (*m*=1,...,10) and $v^k_{m,t}$ be the total holdings value of cluster *m* investors. Then, the value-weighted geographical clustering (GC) for bond *i* that belongs to rating category *k* at quarter *t* is defined as:

$$GC_{i,t} = \sum_{m=1}^{10} \left(\frac{n^k_{m,t}}{\sum_{m=1}^{10} n^k_{m,t}}\right) * \left(\frac{v^k_{m,t}}{\sum_{m=1}^{10} v^k_{m,t}}\right). \qquad \text{(A4)}$$

This value is relatively high if investors for a given rating category is highly clustered (e.g., concentrated in just 2-3 financial centers such as New York and London); it is low if investors holding bonds in a given category are evenly spread across the U.S. and elsewhere.

Bond Flow

Let S_i denote the set of investors holding bond issue *i*, and let $R_{i,t}$ and $V_{i,j,t}$ represent the return and the par amount of bond issue *i* held by investor *j* at quarter *t*. The bond flow is then defined as

$$\sum_{j=1}^{S_i} (V_{i,j,t} - V_{i,j,t-1}(1 + R_{i,t})) / \sum_{j=1}^{S_i} V_{i,j,t-1} . \quad \text{(A5)}$$

Bond Holding Fraction
The bond holding fraction for bond *i* is defined as the total sum of the par amounts of bond *i* held by all institutional investors included in the Lipper database divided by the total debt outstanding for the issuer of bond *i in* a given year. Note that this number is generally lower than the total institutional investor holding of bond *i* divided by the issuance size of bond *i*.

Stock turnover
A firm's stock turnover is calculated in the same manner as Equation (A2). Investor-level equity portfolio information comes from CDA/Spectrum, a database of quarterly 13-F filings of money managers to the U.S. Securities and Exchange Commission.

Stock Flow
A firm's stock flow is calculated in the same manner as Equation (A5). Investor-level equity portfolio information comes from CDA/Spectrum.

Stock Holding Fraction
The stock holding fraction is defined as the total number of common shares of a given firm that is held by all the institutional investors included in the CDC/Spectrum database divided by the total number of shares outstanding (of the same firm).

Total debt: long term debt (data9)+short term debt (data34)[12]

Market value of assets: stock price (data199) * shares outstanding (data25) + short term debt(data34) + long term debt(data9) + preferred stock liquidation value (data10) – deferred taxes and investment tax credits (data35).

Market leverage: total debt/Market value of assets

Book leverage: total debt/book assets(data6)

Abnormal Return: Cumulative abnormal return measured relative to a CRSP value-weighted market model regression and estimated using the second year prior to the forecast year.

Amihud's Illiquidity: Downloaded from Joel Hasbrouck's website http://pages.stern.nyu.edu/~jhasbrou/Research/GibbsEstimates2006/,

and is defined as the annual average of $1000 * \sqrt{\frac{|R_{i,t}|}{DVol_{i,t}}}$ where $R_{i,t}$ is the return and $DVol_{i,t}$ is the dollar volume of stock *i* at day *t*.

Stock Return Volatility: 12-month rolling sample deviation of monthly stock returns.

[12] The numbers in parentheses refer to the Compustat data item numbers.

Asset size: log(sales) (data12)

Profitability: operating income before depreciation (data13)/book assets (data6)

Altman's Z-Score: 3.3 * pre-tax income (data170) + sales (data12) + 1.4 * retained earnings (data36) + 1.2* (current assets (data4) – current liabilities (data5)) / book assets (data6)

Asset tangibility: net PPE (data8)/book assets (data6)

Research and development: R&D expenditures (data46)/book assets (data6). The missing values are replaced with 0.

R&D dummy: 1 if R&D expenditures (data46) is missing and 0 otherwise

Book Equity: total assets (data6) minus total liabilities [data181] and preferred stock [data10] plus deferred taxes [data35] and convertible debt [data79]. When preferred stock [data10] is missing, we replace it with the redemption value of preferred stock [data56].

Capital Expenditure: Capital Expenditures (data128) /book assets (data6)

Payout Ratio: purchases of common and preferred stock (data115) plus dividends (data21) divided by operating income before depreciation (data13)

Asset Maturity: Gross PPE (data7) / Depreciation and Amortization (data14)

Industry Book Leverage: Median book leverage at 4-digit SIC level.

Geographical Area: We divide the 50 U.S. states into seven geographical areas: area1 (Northwest), area2 (West), area3 (Midwest), area4 (the Gulf states), area5 (East), area6 (South), and area7 (Hawaii and Alaska).

Location Dummies: One dummy for each geographical area. For example, $area1\ dummy_{i,\ (j,)\ t}$ = 1 if the issuer of bond *i* (held by investor *j*) at time *t* is headquartered in the Northwest area, and 0 otherwise.

Credit Rating: senior long-term debt rating (data280). We further synthesize data280 into ten rating categories: AAA, AA, A, BBB, BB, B, CCC, CC, C, NR (note rated).

Credit Rating Dummies: One dummy variable for each rating category from AAA to NR. For example, $AAA\ dummy_{i,t}$ =1 if $credit\ rating_{i,t}$ = AAA, and 0 otherwise.

Table I
Summary Statistics

This table presents summary statistics for the 4,563 firm-year observations in the 1998-2005 period. Variable definitions are provided in the Appendix.

Variables	Data Source	N	Mean	Median	Std. Dev.
Bond Turnover	Lipper/Bloomberg	4,563	0.31	0.26	0.15
Bond Flow	Lipper/Bloomberg	4,563	-0.06	-0.03	0.13
Bond Holding Fraction	Lipper	4,563	0.33	0.29	0.23
Stock Turnover	13F	4,563	0.68	0.68	0.06
Stock Flow	13F	4,563	-0.00	-0.00	0.03
Stock Holding Fraction	13F	4,563	0.48	0.46	0.21
Market Leverage	Compustat	4,563	0.33	0.28	0.23
Book Leverage	Compustat	4,563	0.32	0.30	0.16
Abnormal Return	CRSP	4,563	0.01	0.01	0.39
Amihud's Illiquidity	CRSP	4,563	36.05	24.73	36.32
Stock Return Volatility	CRSP	4,563	0.13	0.11	0.07
Asset Size	Compustat	4,563	7.32	7.25	1.56
Profitability	Compustat	4,563	0.12	0.12	0.08
Altman's Z-Score	Compustat	4,563	1.57	1.59	1.13
Asset Tangibility	Compustat	4,563	0.36	0.31	0.23
Research and Development	Compustat	4,563	0.02	0.00	0.04
Capital Expenditure	Compustat	4,563	0.02	0.03	0.09
Market-to-Book Ratio	Compustat	4,563	1.34	1.05	0.98
Asset Maturity	Compustat	4,563	13.22	14.15	6.78
Bond Maturity	SDC New Issue	947	10.14	10.38	7.44
Bank Debt Maturity	LPC DealScan	1,309	3.50	3.67	2.01

Table II
Bond Investor Behavior: Home Bias and Local Herding

This table presents institutional bond investors' local investing behavior by measuring their ownership and herding of home area bond issues. A bond *i* held by investor *j* at time *t* is said to be owned by a home area investor if investor *j* and the issuer of bond *i* are headquartered in the same *geographical area* (as defined in the Appendix). Panel A presents the results on home bias in bond ownership; panel B presents the results on investor herding of local bonds; and panel C shows preliminary analysis of the relationship between local investing behavior and credit supply imbalances. Following Coval and Moskowitz (2001), *home area raw ownership* is the raw ownership stake of bonds owned by home area investors. (*Home area) local ownership* is the difference between the home area raw ownership and the fraction that would be held by home area investors under the assumption that each investor holds the market portfolio. In other words, *local ownership* measures the degree of home bias in ownership. More specifically, for each bond issue *i* located in area *l*, *local ownership$_i$* is calculated as:

$$Local\ \ Ownership_i = \frac{\sum_{j \in N_{l(i)}} V_{i,j}}{\sum_{j \in M} V_{i,j}} - \frac{\sum_{j \in N_{l(i)}} V_j}{\sum_{j \in M} V_j},$$

where $V_{i,j}$ is the par amount of bond *i* held by investor *j*, V_j is the total par amounts of bonds held by investor *j*, $N_{l(i)}$ is the set of institutional investors located in *area l,* and M represents the institutional investor universe. Investor herding is defined by Equation (A3) in the Appendix. For each bond issue we calculate the herding measure separately for home area investors as well as non-home area investors and compare the two. For fund families with multiple funds holding a given bond *i,* holdings are aggregated at the fund family level (in other words, investor *j* refers to a fund family such as Fidelity, rather than an individual Fidelity fund). In case of multiple outstanding bond issues for a given issuer, we calculate the median values of raw ownership and local ownership measures across all the outstanding bond issues for a given firm-year. Means of home area raw ownership and local ownership across firm-year observations are reported and both two-tailed *t*-test and Wilcoxon rank-sum test are performed to test the null hypothesis that there is no home bias in bond ownership (i.e., local ownership = 0). Note that, in order to compute these home bias measures in a meaningful way, we need to require that there be at least some minimum number of investors in home areas and non-home areas each holding a given bond. We set this minimum number of investors at 3, 5, and 10, and report results accordingly. The number of firm-year observations for each cutoff level appears in the parenthesis. The symbols *, **, and *** indicate statistical significance of the test at the 10%, 5%, and 1% level, respectively.

Panel A: Home Bias in Bond Ownership

Minimum number of investors holding each bond issue	Mean Home Area Raw ownership	Mean Local Ownership	*t*-test	Wilcoxon
>=3 Home Area Investors & >=3 Non-Home Area Investors	32.7%	14.1%	80.49***	62.32***
	(6,503)	(6,503)		
>=5 Home Area Investors & >=5 Non-Home Area Investors	34.7%	14.7%	80.81***	58.86***
	(5,313)	(5,313)		
>=10 Home Area Investors& >=10 Non-Home Area Investors	37.7%	15.3%	75.04***	49.74***
	(3,545)	(3,545)		

Panel B: Investor Herding on Home Area Bonds

Minimum number of investors holding each bond issue	Mean Home Area Investors' Herding Measure on Home Area Bonds	Mean Non-Home Area Investors' Herding Measure on Home Area Bonds	*t*-test	Wilcoxon
>=3 Home Area Investors & >=3 Non-Home Area Investors	0.109	0.092	7.80***	8.00***
	(4,356)	(4,356)		
>=5 Home Area Investors & >=5 Non-Home Area Investors	0.136	0.105	12.40***	12.77***
	(2,633)	(2,633)		
>=10 Home Area Investors& >=10 Non-Home Area Investors	0.172	0.129	13.30***	13.02***
	(1,138)	(1,138)		

Table II (continued)

Panel C presents the univariate test results of the null hypothesis that there is no correlation between the degree of local investing behavior (as reported in panels A and B) and the net credit supply imbalances. For each bond issue i, the *buy-sell trade imbalance*$_i^t$ is defined as follows:

$$\text{Trade Imbalance}_i^t = \left| \frac{\sum_{j \in B_i^t} | N_{i,j}^t | - \sum_{j \in S_i^t} | N_{i,j}^t |}{\sum_{j \in All} V_{i,j}^t} \right| ,$$

where $V_{i,j}^t$ and $N_{i,j}^t$ are the par amount and the net change in the par amount of bond i held by investor j during quarter t, and B_i^t and S_i^t denote the set of investors which are net buyers and sellers of bond i in quarter t, respectively. In case of multiple outstanding bond issues for a given issuer, we calculate the median values of trading imbalances across all the outstanding bond issues for a given firm-year. The sample is sorted by the following procedure: (i) group firms based on either geographical area alone (home area ownership) or both geographic area and industry at the 3-digit SIC code level (herding and clustering), and (ii) assign an industry (home area ownership) or firm (herding and clustering) to the high (low) level sub-group if its sorting value is above (below) the group median. For example, the issuer of bond i that is headquartered in the Northwest area and in the electronic components industry (SIC code = 367) belongs to the "high" herding group if its herding value is above the group median for all electronic components manufacturers headquartered in the Northwest. In contrast, it belongs to the "high" home area ownership group if the electronic components industry median value (within the area) is above the group median for all 3-digit SIC code industries in the Northwest. The number of firm-year observations for each sub-sample appears in the parenthesis. The symbols *, **, and *** indicate statistical significance of the test at the 10%, 5%, and 1% level, respectively.

Panel C: The Relationship between Local Investing Behavior and Trade Imbalances

Sorting Criteria	Mean Trade Imbalance High (≥ median)	Low (< median)	*t*-test	Wilcoxon
Home Area Raw Ownership	0.209	0.192	1.88*	2.88***
	(2,339)	(2,224)		
Herding Measure (HM)	0.244	0.156	9.70***	10.34***
	(2,299)	(2,264)		
Geographic Clustering (GC)	0.268	0.131	15.27***	18.34***
	(2,315)	(2,248)		
Payout Ratio	0.125	0.280	-17.55***	-20.87***
	(2,339)	(2,224)		

Table III
Estimation Results of the Firm's Bond Issuance Choice Model

This table presents the estimation results of the firm's bond issuance choice model as a function of the bond turnover and a set of control variables. The dependent variable is a binary variable equaling one if the firm is a new bond issuer in a given year and 0 otherwise. All the independent variables are lagged values measured in the previous year; their definitions are found in the Appendix.

In column (1), the model does not include industry dummies but the errors are clustered at the two-digit SIC-code industry level. In column (2), the model includes two-digit SIC industry dummies and the errors are clustered at the firm level. Columns (3)-(8) present the results of the model for various subsamples to test our second hypothesis (*H1b*), namely that the sensitivity of the firm's choice to issue bonds is higher the more likely a credit imbalance is. In columns (9)-(10), we examine our fifth hypothesis (*H5*), i.e., the sensitivity of the firm's choice to issue bonds is higher the more financially constrained the firm is. All of the specifications include year dummies, location dummies and credit rating dummies. The symbols *, **, and *** indicate statistical significance of the test that the coefficient is different from 0 at the 10%, 5%, and 1% level, respectively, using heteroscedasticity-robust standard errors with *t*-statistics given in parentheses.

	Full Sample		Home Area Ownership		Investor Herding		Geographic Clustering		Payout Ratio	
Independent Variables			High	Low	High	Low	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Bond Turnover	-0.83**	-0.79**	-1.56***	-0.20	-1.17***	-0.44	-1.17**	-0.56	-0.57	-1.14**
Control Variables	(-2.55)	(-2.56)	(-3.39)	(-0.39)	(-2.82)	(-0.89)	(-2.46)	(-1.25)	(-1.26)	(-2.34)
Bond Flow	-0.10	-0.20	-0.44	-0.16	0.38	-0.73*	0.18	-0.62*	-0.44	0.08
	(-0.43)	(-0.84)	(-1.20)	(-0.45)	(1.07)	(-1.93)	(0.57)	(-1.72)	(-1.14)	(0.27)
Bond Holding Fraction	-0.39***	-0.33**	-0.61***	-0.08	-0.45*	-0.36	-0.41	-0.34	-0.26	-0.76***
	(-3.24)	(-2.06)	(-2.88)	(-0.28)	(-1.92)	(-1.59)	(-1.64)	(-1.60)	(-1.28)	(-2.69)
Stock Turnover	-1.07*	-0.85	-1.89**	-0.46	-1.11	-0.97	-1.23	-0.79	-0.97	-0.26
	(-1.86)	(-1.40)	(-2.12)	(-0.54)	(-1.21)	(-1.16)	(-1.42)	(-0.88)	(-1.16)	(-0.28)
Stock Flow	0.04	0.03	-1.28	1.44	-2.18	1.69	0.17	-0.33	1.28	0.16
	(0.02)	(0.02)	(-0.45)	(0.63)	(-0.92)	(0.63)	(0.07)	(-0.12)	(0.51)	(0.06)
Stock Holding Fraction	0.13	0.10	-0.20	0.04	0.12	0.09	0.25	-0.15	-0.29	0.66**
	(0.71)	(0.52)	(-0.69)	(0.14)	(0.47)	(0.35)	(0.96)	(-0.58)	(-1.25)	(2.23)
Abnormal Return	0.21**	0.21**	0.42***	0.11	0.36**	0.09	0.13	0.29**	0.25*	0.17
	(1.99)	(2.33)	(3.14)	(0.82)	(2.58)	(0.72)	(1.03)	(2.26)	(1.90)	(1.27)
Amihud's Illiquidity	0.00	0.00	0.00	0.00**	0.00	0.00	-0.00	0.00**	0.00*	-0.00
	(1.05)	(1.37)	(0.69)	(2.01)	(0.95)	(0.48)	(-1.11)	(2.12)	(1.79)	(-0.62)
Stock Return Volatility	-2.69***	-2.42***	-3.53**	-1.12	-0.61	-3.92***	-0.78	-5.09***	-3.80***	-1.03
	(-3.89)	(-2.97)	(-2.58)	(-1.14)	(-0.63)	(-3.17)	(-0.81)	(-4.05)	(-2.94)	(-1.05)
Asset Tangibility	0.52*	0.47	-0.68	0.78**	-0.35	1.00***	0.97**	-0.14	-0.01	1.06**
	(1.71)	(1.60)	(-1.43)	(2.04)	(-0.82)	(2.88)	(2.42)	(-0.36)	(-0.04)	(2.35)
Firm Size	0.30***	0.32***	0.33***	0.30***	0.33***	0.36***	0.30***	0.32***	0.38***	0.22***
	(6.31)	(7.40)	(5.40)	(5.23)	(5.30)	(5.50)	(4.80)	(5.22)	(6.72)	(3.26)
Profitability	0.32	0.32	0.57	0.26	1.09	0.40	0.87	0.44	2.03**	-0.07
	(0.48)	(0.46)	(0.52)	(0.30)	(1.11)	(0.36)	(0.97)	(0.44)	(2.09)	(-0.08)
R&D Expenditure	-0.58	-1.82	-0.02	-6.79	-1.80	0.19	-0.67	-2.81	-2.05	-1.69
	(-0.39)	(-1.27)	(-0.02)	(-1.64)	(-0.83)	(0.08)	(-0.32)	(-1.29)	(-0.90)	(-0.76)
R&D Dummy	0.16*	0.19**	0.19	0.12	0.13	0.29**	0.14	0.20	0.12	0.25
	(1.88)	(2.04)	(1.47)	(0.81)	(0.92)	(2.19)	(1.10)	(1.42)	(0.98)	(1.65)
Altman's z-Score	-0.12**	-0.14**	-0.18**	-0.09	-0.13*	-0.13	-0.05	-0.20**	-0.26***	-0.02
	(-2.11)	(-2.40)	(-1.98)	(-1.17)	(-1.70)	(-1.52)	(-0.59)	(-2.47)	(-3.67)	(-0.21)
Asset Maturity	0.01	0.00	0.02**	-0.01	0.01	0.00	-0.00	0.01	0.01	-0.02
	(1.01)	(0.32)	(1.96)	(-0.69)	(0.68)	(0.29)	(-0.39)	(0.70)	(1.37)	(-1.42)
Capital Expenditure	1.53	2.01**	5.66***	1.62	1.57	2.15	-0.59	5.09***	3.02**	0.98
	(1.29)	(2.11)	(3.12)	(1.44)	(1.24)	(1.54)	(-0.49)	(3.64)	(2.56)	(0.75)
Market-to-Book	-0.02	-0.01	-0.02	-0.08	-0.01	-0.04	0.02	-0.07	-0.03	-0.01
	(-0.51)	(-0.36)	(-0.38)	(-1.60)	(-0.23)	(-0.71)	(0.66)	(-1.23)	(-0.61)	(-0.30)
Book Leverage	0.49**	0.50*	-0.10	1.00**	0.76**	0.27	0.83**	0.36	0.03	0.83**
	(2.11)	(1.67)	(-0.23)	(2.24)	(2.06)	(0.55)	(2.13)	(0.79)	(0.07)	(1.96)
Intercept	-3.43***	-4.57***	-8.06***	-5.98***	-5.32***	-4.47***	-4.50***	-3.79***	-4.16***	-5.10***
	(-4.95)	(-5.21)	(-8.77)	(-5.58)	(-4.59)	(-4.82)	(-4.35)	(-3.98)	(-4.76)	(-4.30)
Year & Location & Ratings Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustering at	Industry	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Pseudo R-squared	0.2287	0.2465	0.2683	0.2999	0.2678	0.2697	0.2489	0.2464	0.2320	0.2706
Number of Observations	4,563	4,563	2,266	2,297	2,299	2,263	2,315	2,248	2,339	2,224

Table IV
Estimation Results of the Firm's Equity Issuance Choice Model

This table presents the estimation results of the firm's equity issuance choice model as a function of the bond turnover and a set of control variables. The dependent variable is a binary variable equaling one if the firm is a new equity issuer in a given year and 0 otherwise. All the independent variables are lagged values measured in the previous year; their definitions are found in the Appendix.

In column (1), the model does not include industry dummies but the errors are clustered at the two-digit SIC-code industry level. In column (2), the model includes two-digit SIC industry dummies and the errors are clustered at the firm level. Columns (3)-(8) present the results of the model for various subsamples to test our second hypothesis (*H1b*), namely that the sensitivity of the firm's choice to issue equity is higher the more likely a credit imbalance is. In columns (9)-(10), we examine our fifth hypothesis (*H5*), i.e., the sensitivity of the firm's choice to issue equity is higher the more financially constrained the firm is. All of the specifications include year dummies, location dummies and credit rating dummies. The symbols *, **, and *** indicate statistical significance of the test that the coefficient is different from 0 at the 10%, 5%, and 1% level, respectively, using heteroscedasticity-robust standard errors with *t*-statistics given in parentheses.

	Full Sample		Home Area Ownership		Investor Herding		Geographical Clustering		Payout Ratio	
Independent Variables			High	Low	High	Low	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Bond Turnover	0.52**	0.55**	0.87**	0.03	0.87**	0.10	0.66**	0.28	-0.40	0.71**
	(2.36)	(2.12)	(2.36)	(0.08)	(2.54)	(0.23)	(2.10)	(0.52)	(-0.69)	(2.35)
Bond Flow	0.19	0.20	0.22	0.32	0.65**	-0.33	0.22	0.27	0.04	0.29
	(0.81)	(1.03)	(0.73)	(1.13)	(2.36)	(-0.98)	(0.97)	(0.65)	(0.10)	(1.31)
Bond Holding Fraction	-0.37**	-0.32*	-0.75***	-0.08	-0.13	-0.69**	-0.13	-0.56*	-0.64**	-0.11
	(-2.02)	(-1.82)	(-2.80)	(-0.35)	(-0.53)	(-2.43)	(-0.59)	(-1.86)	(-2.29)	(-0.51)
Stock Turnover	0.84	0.83	0.82	0.79	-0.79	2.72**	1.06	0.68	0.74	0.70
	(1.17)	(1.11)	(0.85)	(0.65)	(-0.79)	(2.43)	(1.05)	(0.59)	(0.58)	(0.73)
Stock Flow	2.42*	2.37	0.11	4.29**	2.32	2.93	2.81	1.72	3.48	1.95
	(1.86)	(1.42)	(0.04)	(2.02)	(1.02)	(1.13)	(1.44)	(0.48)	(1.18)	(0.96)
Stock Holding Fraction	-0.09	-0.06	-0.36	-0.01	0.27	-0.15	0.09	-0.21	0.07	-0.03
	(-0.74)	(-0.33)	(-1.34)	(-0.05)	(1.11)	(-0.57)	(0.40)	(-0.69)	(0.23)	(-0.15)
Abnormal Return	0.37***	0.38***	0.53***	0.29***	0.46***	0.37***	0.36***	0.49***	0.29**	0.43***
	(4.66)	(4.97)	(4.30)	(2.76)	(4.48)	(2.76)	(3.97)	(2.96)	(2.06)	(4.51)
Amihud's Illiquidity	-0.01***	-0.00***	-0.01***	-0.00**	-0.01**	-0.01***	-0.00	-0.01***	-0.00	-0.01***
	(-4.15)	(-3.45)	(-3.49)	(-2.15)	(-2.60)	(-3.26)	(-1.42)	(-3.93)	(-1.52)	(-3.18)
Stock Return Volatility	-0.45	-0.44	-1.45*	0.55	0.98	-2.00**	-0.28	-1.19	-1.08	-0.56
	(-1.10)	(-0.82)	(-1.87)	(0.71)	(1.36)	(-2.32)	(-0.42)	(-1.08)	(-0.99)	(-0.87)
Asset Tangibility	-0.09	-0.03	-0.16	0.31	-0.36	0.14	0.41	-0.55	-0.95**	0.51*
	(-0.36)	(-0.12)	(-0.38)	(0.98)	(-1.00)	(0.37)	(1.37)	(-1.26)	(-2.32)	(1.67)
Firm Size	0.06*	0.07**	0.13**	0.05	0.07	0.13**	0.04	0.15**	0.08	0.06
	(1.69)	(2.01)	(2.58)	(0.90)	(1.33)	(2.26)	(0.85)	(2.60)	(1.23)	(1.12)
Profitability	-1.24***	-1.18**	-3.51***	-0.27	-1.42*	-0.60	-0.92	-2.63**	-1.58	-1.01
	(-2.69)	(-2.20)	(-4.12)	(-0.44)	(-1.73)	(-0.74)	(-1.54)	(-2.29)	(-1.45)	(-1.64)
R&D Expenditure	0.56	-0.10	0.34	-1.33	-0.14	1.04	0.82	-4.51*	-5.17*	0.77
	(0.63)	(-0.11)	(0.29)	(-0.76)	(-0.13)	(0.51)	(0.81)	(-1.89)	(-1.79)	(0.73)
R&D Dummy	0.15	0.19**	0.01	0.39***	0.12	0.38***	0.22*	0.19	0.30**	0.17
	(1.40)	(1.98)	(0.05)	(3.02)	(0.94)	(2.72)	(1.83)	(1.32)	(2.37)	(1.16)
Altman's z-Score	-0.13***	-0.14***	0.01	-0.17**	-0.08	-0.21**	-0.10	-0.19**	-0.30***	-0.04
	(-3.14)	(-2.83)	(0.11)	(-2.56)	(-1.14)	(-2.51)	(-1.56)	(-2.20)	(-3.51)	(-0.62)
Asset Maturity	0.00	0.00	0.01	-0.01	-0.00	0.00	-0.01	0.02	0.02*	-0.01*
	(0.38)	(0.17)	(1.48)	(-1.06)	(-0.33)	(0.07)	(-0.83)	(1.63)	(1.90)	(-1.67)
Capital Expenditure	1.99**	1.62*	-0.08	1.77	2.61**	0.75	0.99	2.68	2.98	1.03
	(2.24)	(1.83)	(-0.05)	(1.64)	(2.01)	(0.63)	(0.96)	(1.65)	(1.63)	(1.01)
Market-to-Book	0.11***	0.12***	0.12***	0.12***	0.11***	0.13**	0.09***	0.22***	0.18***	0.11***
	(3.66)	(4.20)	(3.08)	(2.83)	(3.52)	(2.05)	(2.93)	(3.83)	(3.25)	(3.24)
Book Leverage	0.56**	0.65***	0.81**	0.52	0.99***	0.47	0.66**	0.83*	0.19	0.69**
	(2.23)	(2.68)	(2.30)	(1.41)	(2.98)	(1.11)	(2.17)	(1.95)	(0.43)	(2.14)
Intercept	-2.89***	-4.20***	-4.48***	-8.68***	-4.35***	-6.35***	-4.30***	-3.76***	-3.51***	-4.87***
	(-4.07)	(-4.95)	(-3.96)	(-7.30)	(-4.22)	(-5.23)	(-4.04)	(-3.45)	(-3.03)	(-4.64)
Year & Location & Ratings Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustering at	Industry	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Pseudo R-squared	0.1108	0.1449	0.1947	0.1621	0.1771	0.2049	0.1368	0.2224	0.2090	0.1642
Number of Observations	4,563	4,563	2,266	2,297	2,299	2,263	2,315	2,248	2,339	2,224

Table V
Estimation Results of the Firm's Bank Borrowing Choice Model

This table presents the estimation results of the firm's bank borrowing choice model as a function of the bond turnover and a set of control variables. Panel A reports the results of the baseline model. The dependent variable is a binary variable equaling one if the firm borrows from a bank in a given year and 0 otherwise. *Relationship dummy*$_{i,t}$ equals one if firm *i* has completed a relationship lending deal in the past five years and 0 otherwise. A deal is identified as a relationship lending deal if firm *i* borrowed from at least one of the lead arrangers of the given deal in the three years prior to the deal activation date. The variable *Bond turnover*Relationship* is the interaction term. All the other independent variables are lagged values measured in the previous year; their definitions are found in the Appendix.

In column (1), the model does not include industry dummies but the errors are clustered at the two-digit SIC-code industry level. In column (2), the model includes two-digit SIC industry dummies and the errors are clustered at the firm level. Columns (3)-(8) present the results of the model for various subsamples to test the hypothesis (*H1b*), whereas columns (9)-(10) examine the hypothesis (*H5*). All of the specifications include year dummies, location dummies and credit rating dummies. The symbols *, **, and *** indicate statistical significance of the test that the coefficient is different from 0 at the 10%, 5%, and 1% level, respectively, using heteroscedasticity-robust standard errors with *t*-statistics given in parentheses.

Panel A: Full-Sample Baseline Model

	Full Sample		Home Area Ownership		Investor Herding		Geographic Clustering		Payout Ratio	
Independent Variables			High	Low	High	Low	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Bond Turnover	0.31	0.47**	0.58**	0.35	0.76***	-0.16	0.53**	0.01	-0.67	0.95***
	(1.47)	(2.17)	(2.03)	(1.01)	(2.76)	(-0.42)	(1.97)	(0.04)	(-1.53)	(3.52)
Bond Turnover* Relationship Dummy		-0.95**	-0.98	-1.00*	-1.14**	-0.79	-1.51***	0.34	-0.02	-1.35**
		(-2.09)	(-1.42)	(-1.82)	(-2.15)	(-1.00)	(-2.75)	(0.45)	(-0.04)	(-1.97)
Relationship Dummy		0.42***	0.29	0.43**	0.46**	0.39*	0.60***	0.08	0.08	0.56**
		(3.05)	(1.45)	(2.34)	(2.50)	(1.77)	(3.12)	(0.39)	(0.48)	(2.41)
Control Variables										
Bond Flow	0.19	0.16	-0.17	0.51**	0.08	0.37	0.20	0.22	-0.26	0.40*
	(1.00)	(0.87)	(-0.65)	(1.96)	(0.36)	(1.34)	(0.89)	(0.72)	(-0.87)	(1.77)
Bond Holding Fraction	-0.12	-0.12	-0.19	0.09	-0.02	0.01	-0.14	-0.07	-0.25*	-0.03
	(-1.07)	(-1.10)	(-1.29)	(0.53)	(-0.13)	(0.05)	(-0.87)	(-0.40)	(-1.68)	(-0.19)
Stock Turnover	0.17	0.11	-0.22	-0.05	-0.38	-0.32	0.23	-0.88	0.31	-0.20
	(0.33)	(0.22)	(-0.31)	(-0.07)	(-0.57)	(-0.46)	(0.35)	(-1.21)	(0.38)	(-0.31)
Stock Flow	-2.90**	-2.88**	-2.02	-3.16*	-4.88***	-0.74	-3.13*	-1.89	-2.27	-3.02*
	(-2.33)	(-2.30)	(-1.06)	(-1.83)	(-2.78)	(-0.38)	(-1.90)	(-0.92)	(-1.13)	(-1.84)
Stock Holding Fraction	0.12	0.11	0.13	-0.03	0.21	0.64***	-0.30*	1.11***	0.43**	-0.13
	(0.95)	(0.87)	(0.70)	(-0.16)	(1.26)	(3.27)	(-1.75)	(5.81)	(2.20)	(-0.75)
Abnormal Return	0.09	0.09	0.12	0.05	0.21**	-0.05	0.10	0.07	0.07	0.08
	(1.49)	(1.44)	(1.26)	(0.57)	(2.62)	(-0.54)	(1.37)	(0.61)	(0.69)	(1.03)
Amihud's Illiquidity	-0.00	-0.00	-0.00	0.00	0.00	-0.00	-0.00	0.00	-0.00	-0.00
	(-1.30)	(-1.40)	(-1.52)	(-0.09)	(0.40)	(-0.63)	(-1.02)	(-0.05)	(-1.57)	(-0.45)
Stock Return Volatility	-0.41	-0.37	-0.49	-0.37	-0.55	0.86	-0.24	-0.42	0.18	-0.64
	(-0.94)	(-0.84)	(-0.75)	(-0.60)	(-0.88)	(1.27)	(-0.43)	(-0.51)	(0.21)	(-1.12)
Asset Tangibility	0.00	0.01	-0.12	0.11	-0.25	-0.13	0.32	-0.72**	-0.50	0.17
	(0.00)	(0.06)	(-0.38)	(0.45)	(-0.92)	(-0.46)	(1.32)	(-2.33)	(-1.62)	(0.71)
Firm Size	0.15***	0.14***	0.16***	0.14***	0.13***	0.07*	0.08**	0.12***	0.17***	0.12***
	(5.43)	(5.21)	(4.26)	(3.38)	(3.28)	(1.75)	(2.16)	(2.87)	(4.05)	(3.22)
Profitability	0.84**	0.92**	0.53	1.37**	0.52	0.96	1.00*	0.83	1.55**	1.30**
	(1.98)	(2.18)	(0.77)	(2.48)	(0.88)	(1.42)	(1.94)	(0.98)	(2.08)	(2.49)
R&D Expenditure	-3.96***	-3.95***	-4.06***	-2.45	-6.00***	-0.58	-4.25***	-3.75**	-3.52**	-3.88***
	(-3.67)	(-3.71)	(-2.79)	(-1.48)	(-4.25)	(-0.32)	(-3.15)	(-2.15)	(-1.99)	(-2.91)
R&D Dummy	-0.02	-0.02	0.02	0.04	-0.13	0.05	-0.10	0.02	-0.03	0.01
	(-0.37)	(-0.27)	(0.21)	(0.47)	(-1.62)	(0.48)	(-1.28)	(0.27)	(-0.40)	(0.15)
Altman's z-Score	-0.07*	-0.07*	-0.07	-0.07	-0.03	-0.02	-0.07	-0.01	-0.18***	-0.04
	(-1.78)	(-1.84)	(-1.19)	(-1.10)	(-0.54)	(-0.34)	(-1.38)	(-0.13)	(-2.91)	(-0.78)
Asset Maturity	-0.00	-0.00	0.00	-0.00	0.00	-0.00	-0.00	0.00	0.00	-0.01
	(-0.47)	(-0.44)	(0.03)	(-0.14)	(0.37)	(-0.21)	(-0.65)	(0.31)	(0.58)	(-0.86)
Capital Expenditure	-0.22	-0.27	0.48	-0.74	0.59	-0.55	-0.79	0.89	1.81	-1.24
	(-0.32)	(-0.38)	(0.35)	(-0.89)	(0.58)	(-0.58)	(-0.91)	(0.76)	(1.53)	(-1.41)
Market-to-Book	-0.01	-0.01	-0.01	-0.03	-0.04	-0.04	-0.01	-0.05	-0.02	-0.01
	(-0.56)	(-0.53)	(-0.32)	(-0.64)	(-1.02)	(-0.83)	(-0.43)	(-1.06)	(-0.44)	(-0.29)
Book Leverage	-0.27	-0.30	-0.55**	0.25	-0.05	-0.20	-0.38	-0.18	-0.79**	-0.11
	(-1.36)	(-1.54)	(-2.12)	(0.81)	(-0.19)	(-0.64)	(-1.45)	(-0.60)	(-2.63)	(-0.39)
Intercept	-8.66***	-10.30***	-2.84***	-9.09***	-3.49***	-7.78***	-9.69***	-7.84***	-0.77	-9.84***
	(-11.10)	(-7.82)	(-3.28)	(-13.14)	(-4.21)	(-9.69)	(-10.81)	(-10.60)	(-0.95)	(-13.03)
Year & Location & Ratings Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustering at	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Pseudo R-squared	0.1223	0.1247	0.1062	0.1796	0.1134	0.1367	0.1229	0.1348	0.1392	0.1506
Number of Observations	4,563	4,563	2,266	2,297	2,299	2,263	2,315	2,248	2,339	2,224

Panel B Sub-sample (with Maturity Longer than Three years)

Panel B reports the results of the maturity-adjusted model. The dependent variable is a binary variable equaling one if firm *i* borrows from a bank with the loan maturity of more than 3 years during a given year and 0 otherwise. The model is otherwise the same as the model specification in Table III and IV.

	Full Sample		Home Area Ownership		Investor Herding		Geographical Clustering		Payout Ratio	
Independent Variables			High	Low	High	Low	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Bond Turnover	0.54**	0.54**	0.59**	0.47	0.78***	0.04	0.64**	0.05	-0.39	0.90***
	(2.48)	(2.44)	(2.06)	(1.34)	(2.85)	(0.11)	(2.40)	(0.11)	(-1.03)	(3.24)
Control Variables										
Bond Flow	0.10	0.16	-0.23	0.64**	0.18	0.17	0.17	0.15	0.12	0.23
	(0.53)	(0.83)	(-0.88)	(2.14)	(0.68)	(0.63)	(0.69)	(0.49)	(0.41)	(0.93)
Bond Holding Fraction	0.00	-0.10	-0.05	0.02	0.18	-0.26	-0.17	-0.03	-0.29*	0.18
	(0.02)	(-0.81)	(-0.28)	(0.09)	(1.02)	(-1.43)	(-0.84)	(-0.15)	(-1.80)	(0.85)
Stock Turnover	0.47	0.46	0.45	0.32	0.46	-0.17	1.07	-1.03	-0.06	0.36
	(0.82)	(0.85)	(0.59)	(0.37)	(0.62)	(-0.20)	(1.56)	(-1.19)	(-0.07)	(0.55)
Stock Flow	-1.05	-1.18	0.94	-2.65	-1.72	-0.33	-1.57	1.00	0.10	-2.17
	(-0.87)	(-0.86)	(0.49)	(-1.31)	(-0.94)	(-0.15)	(-0.85)	(0.43)	(0.04)	(-1.18)
Stock Holding Fraction	0.17	0.14	0.27	0.01	0.13	0.68***	0.06	0.92***	0.66***	0.18
	(1.07)	(1.03)	(1.39)	(0.04)	(0.70)	(2.92)	(0.37)	(4.11)	(3.12)	(0.97)
Abnormal Return	0.10*	0.09	0.21**	0.00	0.16*	0.03	0.12	0.01	0.16	0.06
	(1.68)	(1.34)	(1.97)	(0.01)	(1.68)	(0.26)	(1.40)	(0.10)	(1.43)	(0.66)
Amihud's Illiquidity	0.00	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.26)	(0.08)	(-0.37)	(0.87)	(1.17)	(0.41)	(0.05)	(1.32)	(0.32)	(1.61)
Stock Return Volatility	0.10	0.21	0.18	0.47	-0.03	1.91**	0.61	-0.78	1.90**	-0.04
	(0.20)	(0.44)	(0.26)	(0.66)	(-0.04)	(2.37)	(1.05)	(-0.78)	(2.12)	(-0.06)
Asset Tangibility	-0.00	0.05	-0.44	0.21	-0.18	0.08	0.21	-0.30	-0.29	-0.06
	(0.00)	(0.26)	(-1.27)	(0.76)	(-0.61)	(0.26)	(0.79)	(-0.88)	(-0.88)	(-0.23)
Firm Size	0.12***	0.14***	0.10**	0.19***	0.12***	0.08*	0.09**	0.11**	0.10**	0.11**
	(4.54)	(4.78)	(2.63)	(4.26)	(2.97)	(1.81)	(2.38)	(2.48)	(2.45)	(2.51)
Profitability	2.27***	1.90***	2.64***	1.88***	1.98***	1.05	1.63***	2.49***	2.27***	1.82***
	(3.56)	(4.17)	(3.59)	(3.01)	(3.11)	(1.48)	(2.97)	(2.68)	(2.81)	(3.12)
R&D Expenditure	-4.55***	-5.02***	-5.88***	-3.72*	-6.06***	-3.01	-4.28***	-7.31***	-4.32**	-5.26***
	(-4.66)	(-3.74)	(-3.35)	(-1.80)	(-3.32)	(-1.44)	(-2.65)	(-3.23)	(-2.01)	(-3.04)
R&D Dummy	-0.03	-0.01	0.01	0.05	-0.01	-0.03	-0.10	-0.01	-0.16*	0.09
	(-0.42)	(-0.12)	(0.09)	(0.53)	(-0.08)	(-0.29)	(-1.13)	(-0.10)	(-1.72)	(0.96)
Altman's z-Score	-0.12***	-0.08*	-0.09	-0.09	-0.05	0.04	0.02	-0.13**	-0.07	-0.03
	(-3.20)	(-1.92)	(-1.53)	(-1.48)	(-0.94)	(0.65)	(0.28)	(-1.98)	(-1.12)	(-0.45)
Asset Maturity	0.00	-0.00	0.00	-0.00	0.00	-0.00	0.01	-0.00	0.01	-0.00
	(0.18)	(-0.23)	(0.49)	(-0.63)	(0.06)	(-0.12)	(0.86)	(-0.31)	(0.90)	(-0.68)
Capital Expenditure	-0.50	-0.50	1.51	-1.04	-0.48	0.32	-1.06	0.74	-0.39	-0.62
	(-0.63)	(-0.60)	(1.00)	(-1.07)	(-0.39)	(0.31)	(-1.06)	(0.59)	(-0.31)	(-0.63)
Market-to-Book	-0.02	-0.01	-0.02	-0.02	-0.05	-0.04	-0.01	-0.05	-0.04	-0.02
	(-0.64)	(-0.55)	(-0.58)	(-0.43)	(-1.13)	(-0.79)	(-0.28)	(-1.00)	(-0.96)	(-0.49)
Book Leverage	0.09	0.03	-0.21	0.47	0.16	0.24	0.28	-0.19	-0.39	0.58**
	(0.47)	(0.15)	(-0.76)	(1.54)	(0.61)	(0.76)	(1.02)	(-0.59)	(-1.23)	(2.06)
Intercept	-3.36***	-9.12***	-2.93***	-10.71***	-8.51***	-8.48***	-3.19***	-6.84***	-8.01***	-8.65***
	(-5.54)	(-15.06)	(-3.23)	(-13.45)	(-12.45)	(-11.41)	(-4.93)	(-6.19)	(-8.85)	(-12.75)
Year & Location & Ratings Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustering at	Industry	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Pseudo R-squared	0.0814	0.0997	0.1062	0.1414	0.1101	0.1127	0.0865	0.1223	0.0929	0.1286
Number of Observations	4,563	4,563	2,266	2,297	2,299	2,263	2,315	2,248	2,339	2,224

Panel C Bank Loan vs. Bond Debt Choice Model

Panel C presents the results of the firm's bank loan vs. bond debt choice model. The dependent variable is a binary variable equaling one if it is a bank loan deal and 0 if it is a bond deal. To address the potential self-selection issue, we run a first-stage probit regression (unreported) where the dependent variable equals one if the firm issues debt (bank loan or bond) with maturity of more than 3 years in a given year and 0 otherwise and include the inverse Mill's ratio (constructed from the first stage estimation) in the second stage regression.

	Full Sample		Home Area Ownership		Investor Herding		Geographical Clustering		Payout Ratio	
Independent Variables			High	Low	High	Low	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Bond Turnover	1.29**	1.20**	1.14*	0.82	2.18***	-0.33	1.75**	0.01	-0.19	2.52***
	(2.19)	(2.36)	(1.74)	(1.01)	(3.09)	(-0.37)	(2.45)	(0.02)	(-0.22)	(3.65)
Control Variables										
Bond Flow	-0.19	-0.11	-0.19	0.04	-0.81	0.76	-0.40	0.26	0.68	-0.53
	(-0.62)	(-0.24)	(-0.29)	(0.06)	(-1.27)	(1.09)	(-0.59)	(0.38)	(1.03)	(-0.78)
Bond Holding Fraction	0.44*	0.41	0.50	0.77	0.85*	0.26	1.11**	0.38	0.37	1.05**
	(1.84)	(1.52)	(1.40)	(1.60)	(1.87)	(0.60)	(2.50)	(0.97)	(1.03)	(2.10)
Stock Turnover	1.61*	1.51	1.58	0.65	3.27*	0.51	2.43	-0.35	0.69	3.04
	(1.71)	(1.42)	(1.06)	(0.37)	(1.69)	(0.33)	(1.38)	(-0.22)	(0.48)	(1.51)
Stock Flow	-0.85	-1.27	4.53	-4.74	1.62	-3.47	-2.99	2.32	4.81	-11.02**
	(-0.27)	(-0.45)	(1.04)	(-1.14)	(0.36)	(-0.87)	(-0.71)	(0.51)	(1.24)	(-2.38)
Stock Holding Fraction	0.30	0.52*	0.61	0.24	0.04	0.87*	0.07	0.93**	0.82**	-0.31
	(1.17)	(1.84)	(1.51)	(0.58)	(0.10)	(1.86)	(0.15)	(2.14)	(2.10)	(-0.66)
Abnormal Return	-0.15	-0.28	-0.30	-0.20	-0.42	-0.26	-0.39	-0.42*	-0.46*	-0.16
	(-1.17)	(-1.55)	(-1.24)	(-0.80)	(-1.44)	(-0.95)	(-1.35)	(-1.68)	(-1.75)	(-0.58)
Amihud's Illiquidity	0.00	0.00	0.00	0.00	-0.00	0.00	0.00	-0.00	-0.00	0.00
	(0.82)	(-0.02)	(0.15)	(0.36)	(-0.50)	(0.97)	(-0.13)	(-0.34)	(-1.00)	(0.52)
Stock Return Volatility	3.20**	4.36***	2.26	6.81***	1.92	7.95***	2.73	7.77***	9.78***	0.54
	(2.51)	(3.07)	(1.25)	(3.45)	(0.87)	(3.61)	(1.51)	(3.48)	(4.57)	(0.32)
Asset Tangibility	-0.48	-0.50	0.09	-1.25**	0.16	-0.82	-2.11***	0.69	0.36	-2.72***
	(-1.53)	(-1.24)	(0.15)	(-2.40)	(0.27)	(-1.40)	(-3.11)	(1.11)	(0.65)	(-3.94)
Firm Size	-0.19***	-0.38***	-0.12	-0.43***	-0.47***	-0.30*	-0.55***	-0.44***	-0.61***	-0.17
	(-4.60)	(-3.82)	(-1.19)	(-3.00)	(-3.48)	(-1.71)	(-3.21)	(-3.50)	(-4.27)	(-1.19)
Profitability	1.58	0.06	1.48	-0.77	1.18	-2.11	-2.47	1.12	-2.39	2.30
	(1.19)	(0.04)	(0.88)	(-0.44)	(0.64)	(-1.11)	(-1.39)	(0.61)	(-1.25)	(1.18)
R&D Expenditure	-2.63	0.49	-4.12	6.15	-0.42	0.57	2.22	3.47	10.32**	-4.81
	(-1.04)	(0.17)	(-1.26)	(1.07)	(-0.09)	(0.11)	(0.49)	(0.67)	(2.27)	(-1.21)
R&D Dummy	-0.20	-0.35***	-0.06	0.05	-0.08	-0.45**	-0.47**	-0.25	-0.35**	-0.16
	(-1.64)	(-2.97)	(-0.34)	(0.28)	(-0.40)	(-2.46)	(-2.49)	(-1.31)	(-2.17)	(-0.73)
Altman's z-Score	0.07	0.21**	0.13	0.16	0.04	0.41**	0.29*	0.21	0.38**	-0.14
	(0.94)	(2.12)	(1.03)	(1.16)	(0.28)	(2.23)	(1.93)	(1.41)	(2.55)	(-0.94)
Asset Maturity	-0.00	-0.01	-0.02	-0.01	-0.01	-0.02	0.03	-0.04**	-0.02	0.04*
	(-0.41)	(-1.18)	(-0.98)	(-0.93)	(-0.70)	(-1.24)	(1.42)	(-2.22)	(-1.56)	(1.84)
Capital Expenditure	-1.85	-1.96	-1.57	-2.30	-3.81**	1.27	-0.26	-3.41	-3.81	-1.81
	(-1.44)	(-1.34)	(-0.63)	(-1.15)	(-2.07)	(0.51)	(-0.13)	(-1.43)	(-1.61)	(-0.87)
Market-to-Book	0.01	0.03	-0.06	0.19	0.02	0.05	0.16	-0.04	0.09	0.08
	(0.11)	(0.45)	(-0.63)	(1.63)	(0.16)	(0.45)	(1.38)	(-0.31)	(0.79)	(0.65)
Book Leverage	0.22	0.03	0.63	0.02	-0.37	0.49	-0.05	-0.28	-0.59	0.37
	(0.79)	(0.05)	(0.97)	(0.02)	(-0.50)	(0.55)	(-0.07)	(-0.42)	(-0.85)	(0.45)
Inverse Mill's Ratio		1.09	-0.32	2.44**	1.66	0.73	2.38*	2.16**	3.24***	0.29
		(1.51)	(-0.50)	(2.52)	(1.47)	(0.53)	(1.69)	(2.44)	(3.06)	(0.14)
Intercept	-0.88	1.09	1.01	2.74	2.25	2.07	3.50*	2.33	4.57***	2.52***
	(-0.84)	(0.94)	(0.66)	(1.59)	(1.33)	(1.11)	(1.92)	(1.37)	(2.70)	(3.65)
Year & Location & Ratings Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustering at	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Pseudo R-squared	0.2150	0.2398	0.2093	0.3457	0.2945	0.2783	0.3352	0.2053	0.2355	0.3549
Number of Observations	1,048	1,033	544	483	480	551	459	574	638	395

Panel D Sub-sample (CP Backup Line of Credit)

Panel D presents the estimation results of the firm's CP issuance choice model using data on the incidence of commercial paper backup line of credit. The dependent variable is a binary variable equaling one if the firm receives a CP backup line of credit during a given year and 0 otherwise.

	Full Sample		Home Area Ownership		Investor Herding		Geographical Clustering		Payout Ratio	
Independent Variables			High	Low	High	Low	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Bond Turnover	-1.46***	-1.46**	-1.92***	-1.33	-2.08**	-1.31*	-2.46***	-0.97	-0.90	-3.05***
	(-3.12)	(-2.38)	(-3.06)	(-1.34)	(-2.53)	(-1.66)	(-2.78)	(-1.19)	(-1.26)	(-2.93)
Control Variables										
Bond Flow	0.69	0.86**	0.28	1.07*	0.89	0.59	0.35	0.87	0.79	1.46**
	(1.35)	(2.05)	(0.45)	(1.90)	(1.48)	(0.91)	(0.75)	(1.41)	(1.44)	(2.27)
Bond Holding Fraction	0.03	0.15	-0.07	0.49	-0.23	0.03	-0.77	0.72**	0.16	0.21
	(0.13)	(0.61)	(-0.25)	(1.17)	(-0.55)	(0.11)	(-1.57)	(2.14)	(0.52)	(0.42)
Stock Turnover	-0.17	0.31	3.16**	-3.12**	-3.37**	2.24*	-0.39	-0.11	0.22	-2.03
	(-0.18)	(0.30)	(2.19)	(-2.42)	(-2.44)	(1.76)	(-0.26)	(-0.07)	(0.17)	(-1.14)
Stock Flow	-3.04	-3.67	-0.14	-2.51	-5.68	0.12	-5.29	-3.55	-1.21	-9.02**
	(-1.26)	(-1.54)	(-0.04)	(-0.76)	(-1.59)	(0.04)	(-1.49)	(-1.02)	(-0.38)	(-2.31)
Stock Holding Fraction	0.03	0.10	0.13	0.52	0.24	0.79**	1.14**	-1.07***	0.18	0.52
	(0.12)	(0.40)	(0.38)	(1.30)	(0.60)	(2.56)	(2.20)	(-3.21)	(0.53)	(1.05)
Abnormal Return	-0.04	-0.07	-0.07	-0.07	-0.03	-0.14	0.01	-0.03	-0.08	-0.14
	(-0.34)	(-0.60)	(-0.43)	(-0.42)	(-0.14)	(-0.84)	(0.07)	(-0.17)	(-0.56)	(-0.68)
Amihud's Illiquidity	0.00	0.00	-0.00	0.01**	0.00	0.00*	-0.00	0.00	0.00	-0.00
	(1.13)	(1.34)	(-0.71)	(2.52)	(1.01)	(1.81)	(-0.32)	(1.64)	(1.39)	(-0.61)
Stock Return Volatility	-3.54***	-3.28**	-1.47	-1.83	-3.80**	1.07	-5.63***	-1.54	-3.49*	-1.35
	(-3.39)	(-2.45)	(-0.89)	(-1.12)	(-2.02)	(0.76)	(-2.67)	(-0.82)	(-1.76)	(-0.84)
Asset Tangibility	-0.54	-0.65	-0.63	-1.33**	-0.91	-0.56	-1.29*	-0.40	-0.89	-1.51*
	(-0.90)	(-1.31)	(-0.87)	(-2.07)	(-1.43)	(-0.99)	(-1.76)	(-0.63)	(-1.60)	(-1.72)
Firm Size	0.32***	0.41***	0.41***	0.35***	0.47***	0.34***	0.41***	0.52***	0.43***	0.32***
	(5.05)	(7.67)	(6.26)	(4.24)	(5.34)	(4.40)	(4.20)	(8.13)	(7.03)	(3.87)
Profitability	1.30	0.71	0.08	0.84	1.98	0.47	2.25	1.65	1.59	1.38
	(1.46)	(0.65)	(0.05)	(0.64)	(1.42)	(0.33)	(1.31)	(1.01)	(1.15)	(0.74)
R&D Expenditure	-1.72	-1.78	-3.23	2.83	1.75	-5.49*	-1.83	-3.35	-7.63**	3.20
	(-0.63)	(-0.77)	(-1.15)	(0.93)	(1.18)	(-1.75)	(-0.53)	(-0.99)	(-2.33)	(1.36)
R&D Dummy	0.01	-0.01	-0.02	-0.08	-0.00	-0.06	0.30	-0.13	-0.15	0.21
	(0.13)	(-0.06)	(-0.10)	(-0.45)	(-0.01)	(-0.36)	(1.46)	(-0.68)	(-0.93)	(1.05)
Altman's z-Score	-0.14	-0.05	-0.05	0.00	-0.27**	0.22**	-0.15	-0.15	-0.12	-0.01
	(-1.53)	(-0.60)	(-0.37)	(0.04)	(-2.61)	(2.09)	(-1.31)	(-1.20)	(-1.24)	(-0.10)
Asset Maturity	0.01	0.01	0.01	0.02	-0.01	0.01	0.04**	-0.02	0.00	0.01
	(0.81)	(0.90)	(0.61)	(1.48)	(-0.59)	(0.66)	(2.35)	(-1.17)	(0.34)	(0.71)
Capital Expenditure	-0.14	0.62	-1.75	2.44	-2.40	3.13*	-4.50*	3.99*	4.53**	-3.48
	(-0.09)	(0.38)	(-0.57)	(1.45)	(-0.98)	(1.72)	(-1.68)	(1.83)	(2.45)	(-1.17)
Market-to-Book	-0.09**	-0.10	-0.01	-0.17*	0.00	-0.14*	0.00	-0.20**	-0.10	-0.07
	(-1.99)	(-1.55)	(-0.17)	(-1.88)	(0.06)	(-1.69)	(0.04)	(-2.24)	(-1.41)	(-0.81)
Book Leverage	-0.33	-0.52	-0.34	1.03	-0.14	0.13	-0.68	-0.82	-0.58	-0.30
	(-0.58)	(-1.14)	(-0.57)	(1.50)	(-0.23)	(0.22)	(-0.97)	(-1.32)	(-0.97)	(-0.43)
Intercept	-6.58***	-13.37***	-8.45***	-6.13***	-5.40***	-7.85***	-6.76***	-9.89***	-8.59***	-6.34***
	(-5.17)	(-10.24)	(-4.98)	(-3.35)	(-3.30)	(-6.47)	(-4.07)	(-6.53)	(-5.91)	(-3.20)
Year & Location & Ratings Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustering at	Industry	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Pseudo R-squared	0.3902	0.4293	0.3850	0.4350	0.5200	0.3330	0.5230	0.4095	0.3883	0.5478
Number of Observations	4,563	4,563	2,266	2,297	2,299	2,263	2,315	2,248	2,339	2,224

Table VI
Multinomial Logit Model: The Firm's Choice of Bond, Equity, Bank Loan, and CP

This table presents the result of multinomial logit estimation of the firm's financing decision model as a function of the bond turnover and a set of control variables. We consider bond, equity, bank loan, and CP as the firm's four financing choices. The dependent variable is a discrete variable corresponding to the firm's choice of external financing. Thus, it is a multinomial variable equaling *j* (*j*= 0, .., 4) if the firm chooses *j* of the 5 financing vehicle choices: bond, equity, bank loans, CP backup line of credit (our proxy for CP issuance), and no financing (normalized group). In case of multiple types of financing vehicles chosen in a given year, we use the decision tree shown in Fig. 1 to break ties.

All the independent variables are lagged values measured in the previous year; their definitions are found in the Appendix. All of the specifications include year dummies, location dummies and credit rating dummies. The symbols *, **, and *** indicate statistical significance of the test that the coefficient is different from 0 at the 10%, 5%, and 1% level, respectively, using heteroscedasticity-robust standard errors with *t*-statistics given in parentheses.

	CP	Bond	Equity	Bank Loan	CP	Bond	Equity	Bank Loan
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bond Turnover	-2.48***	-1.71**	1.07**	0.96**	-2.45**	-1.55**	1.13**	0.96**
	(-2.66)	(-2.60)	(2.44)	(2.29)	(-2.16)	(-2.43)	(1.98)	(2.03)
Control Variables								
Bond Flow	1.34	-0.25	0.45	0.25	1.53*	-0.45	0.48	0.41
	(1.21)	(-0.55)	(0.91)	(0.58)	(1.77)	(-0.92)	(1.09)	(0.99)
Bond Holding Fraction	0.02	-0.74***	-0.87**	-0.01	0.22	-0.69**	-0.82**	-0.22
	(0.04)	(-3.29)	(-1.96)	(-0.04)	(0.45)	(-2.10)	(-1.97)	(-0.75)
Stock Turnover	-0.01	-1.21	2.19	1.59	0.58	-0.92	2.32	1.64
	(-0.01)	(-1.06)	(1.35)	(1.41)	(0.29)	(-0.77)	(1.28)	(1.56)
Stock Flow	-6.06	-2.12	3.86*	-4.22	-7.13	-2.44	4.05	-4.18
	(-1.17)	(-0.54)	(1.67)	(-1.66)	(-1.49)	(-0.67)	(1.09)	(-1.30)
Stock Holding Fraction	0.00	0.36	0.05	0.21	0.11	0.31	0.05	0.14
	(0.01)	(1.05)	(0.17)	(0.67)	(0.20)	(0.82)	(0.11)	(0.48)
Abnormal Return	0.09	0.44*	0.80***	0.26*	0.00	0.40**	0.81***	0.25
	(0.41)	(1.92)	(5.04)	(1.93)	(0.01)	(1.98)	(4.66)	(1.62)
Amihud's Illiquidity	0.00	0.00	-0.01***	0.00	0.00	0.00	-0.01***	0.00
	(1.15)	(0.72)	(-3.12)	(0.23)	(1.19)	(0.98)	(-3.41)	(0.05)
Stock Return Volatility	-8.49***	-4.86***	-0.87	-0.54	-8.09***	-3.90**	-0.96	-0.45
	(-4.15)	(-3.16)	(-1.06)	(-0.58)	(-2.91)	(-2.37)	(-0.87)	(-0.43)
Asset Tangibility	-0.86	0.86	-0.19	-0.10	-0.90	0.79	-0.07	-0.13
	(-0.66)	(1.54)	(-0.41)	(-0.27)	(-0.94)	(1.31)	(-0.14)	(-0.29)
Firm Size	0.75***	0.52***	0.10	0.19***	0.96***	0.58***	0.16*	0.24***
	(5.46)	(5.42)	(1.07)	(2.70)	(9.16)	(6.74)	(1.80)	(3.73)
Profitability	3.30*	1.39	-1.78*	4.72***	2.45	0.95	-2.47**	4.31***
	(1.82)	(0.91)	(-1.67)	(3.84)	(1.11)	(0.60)	(-2.19)	(4.47)
R&D Expenditure	-5.05	-3.97	0.34	-9.68***	-6.54	-7.07**	-0.64	-10.27***
	(-0.95)	(-1.23)	(0.17)	(-4.06)	(-1.36)	(-2.19)	(-0.35)	(-3.11)
R&D Dummy	0.04	0.31**	0.19	-0.09	-0.02	0.34*	0.25	-0.05
	(0.19)	(2.02)	(0.84)	(-0.59)	(-0.08)	(1.70)	(1.08)	(-0.36)
Altman's z-Score	-0.37**	-0.30**	-0.26***	-0.20***	-0.22	-0.31**	-0.18*	-0.12
	(-1.96)	(-2.62)	(-3.49)	(-2.80)	(-1.40)	(-2.61)	(-1.89)	(-1.33)
Asset Maturity	0.02	0.01	-0.01	0.01	0.02	0.00	-0.01	0.01
	(0.82)	(1.01)	(-0.39)	(1.27)	(0.84)	(0.33)	(-0.45)	(0.94)
Capital Expenditure	0.59	2.24	3.13**	-1.16	2.40	3.24*	3.27*	-0.74
	(0.16)	(1.08)	(2.06)	(-0.86)	(0.75)	(1.70)	(1.74)	(-0.44)
Market-to-Book	-0.19**	0.02	0.20***	-0.10	-0.18	0.05	0.20***	-0.11
	(-2.17)	(0.26)	(3.65)	(-1.58)	(-1.44)	(0.64)	(3.75)	(-1.47)
Book Leverage	-0.41	0.85*	0.88*	0.02	-0.97	0.76	1.22**	-0.07
	(-0.41)	(1.69)	(1.87)	(0.04)	(-1.07)	(1.23)	(2.32)	(-0.18)
Intercept	-15.84***	-7.48***	-5.66***	-8.37***	-17.98***	-7.61***	-6.90***	-9.56***
	(-6.79)	(-8.38)	(-3.57)	(-6.35)	(-6.02)	(-4.71)	(-3.98)	(-7.41)
Year & Location & Ratings Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	-	-	-	-	Yes	Yes	Yes	Yes
Clustering at	Industry	Industry	Industry	Industry	Firm	Firm	Firm	Firm
Pseudo R-squared	0.2041	0.2041	0.2041	0.2041	0.2207	0.2207	0.2207	0.2207
Number of Observations	4,563	4,563	4,563	4,563	4,563	4,563	4,563	4,563

Table VII
Debt Maturity

This table presents the results of tobit estimation of the firm's debt maturity choice model as a function of the bond turnover and a set of control variables. Panel A (columns (1)-(6)) reports the maturity choice model estimation results for the bond issue sample; Panel B (columns (7)-(12)) reports the maturity choice estimation results for the bank loan sample. The dependent variable in column (1)-(6) is bond maturity in number of years and left censored at 0. The dependent variable in column (7)-(12) is bank debt maturity in number of years and left censored at 0. We calculate the value-weighted average of bond turnover across all the funds with holdings in each rating-maturity level. "Short-term bond refinancing risk" is the median (across maturity levels) of these category-specific turnovers for bonds with maturity less than 3 years for each rating category from AAA to NR. "Long-term bond refinancing risk" is the median (across maturity levels) of these turnovers for bonds with maturity longer than 5 years for each rating category. To address the potential endogeneity of debt instrument choice, we run an (unreported) first-stage regression of bank loan vs. bond binary probit choice model and include the inverse Mill's ratio (Heckman's lambda) in the second-stage regression.

All the independent variables are lagged values measured in the previous year; their definitions are found in the Appendix. All of the specifications include year dummies, location dummies and credit rating dummies. The symbols *, **, and *** indicate statistical significance of the test that the coefficient is different from 0 at the 10%, 5%, and 1% level, respectively, using heteroscedasticity-robust standard errors with *t*-statistics given in parentheses.

	Panel A: Bond Maturity						Panel B: Bank Debt Maturity					
	Full Sample		Home Area Ownership		Investor Herding		Full Sample		Home Area Ownership		Investor Herding	
Independent			High	Low	High	Low			High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Bond long-term	-40.05**	-49.07**	-73.06**	-24.60	-66.71**	-8.72	8.85***	8.38***	12.27**	4.72	7.28*	8.21
Turnover	(-2.11)	(-2.39)	(-2.51)	(-0.68)	(-2.51)	(-0.20)	(3.03)	(2.72)	(2.86)	(1.06)	(1.83)	(1.64)
Bond short-term		15.53	19.70	11.75	42.27**	-1.35		3.28	0.38	3.90	3.19	3.38
Turnover		(1.38)	(1.47)	(0.52)	(2.59)	(-0.08)		(1.23)	(0.11)	(0.92)	(0.89)	(0.81)
Control Variables												
Bond Flow	-1.60	-1.91	-3.55	-0.96	-3.24	-0.67	0.12	0.19	-0.22	0.45	-0.16	0.40
	(-0.63)	(-0.75)	(-0.90)	(-0.29)	(-1.02)	(-0.19)	(0.25)	(0.40)	(-0.35)	(0.66)	(-0.28)	(0.46)
Bond Holding Fraction	2.33	2.03	4.66**	0.25	-4.83	1.47	0.38	0.36	0.54	0.34	1.09***	-0.67
	(1.46)	(1.27)	(2.10)	(0.10)	(-1.21)	(0.71)	(1.35)	(1.25)	(1.34)	(0.82)	(2.76)	(-1.65)
Stock Turnover	-0.49	-2.16	-17.66	6.83	2.52	-17.23*	1.33	1.56	1.50	1.10	3.00**	-0.88
	(-0.07)	(-0.30)	(-1.57)	(0.71)	(0.95)	(-1.86)	(1.25)	(1.45)	(1.06)	(0.67)	(2.13)	(-0.53)
Stock Flow	10.44	12.77	4.59	24.01	19.41	34.84	2.08	2.01	4.26	0.58	7.63*	-3.27
	(0.60)	(0.73)	(0.18)	(0.96)	(1.60)	(1.59)	(0.70)	(0.67)	(0.88)	(0.15)	(1.84)	(-0.75)
Stock Holding Fraction	-0.11	-0.05	-2.20	0.09	-8.21	0.98	0.67**	0.74**	1.05**	0.58	0.75*	0.62
	(-0.07)	(-0.03)	(-0.88)	(0.04)	(-0.27)	(0.46)	(2.32)	(2.51)	(2.39)	(1.42)	(1.91)	(1.40)
Abnormal Return	0.50	0.49	1.93	-0.34	-1.57	1.26	0.11	0.10	0.28	0.02	-0.08	0.14
	(0.55)	(0.53)	(1.34)	(-0.28)	(-0.63)	(1.03)	(0.75)	(0.72)	(1.25)	(0.12)	(-0.38)	(0.63)
Amihud's Illiquidity	0.01	0.01	0.01	0.02	0.63	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	(1.09)	(0.96)	(1.31)	(1.49)	(0.43)	(1.26)	(0.91)	(0.94)	(0.66)	(0.67)	(0.39)	(0.97)
Stock Return	-12.69	-13.46*	-13.64	-12.97	-0.02	-20.12	-0.90	-0.72	-2.05	0.77	0.56	-1.45
	(-1.62)	(-1.70)	(-1.27)	(-1.09)	(-1.16)	(-1.64)	(-0.78)	(-0.63)	(-1.12)	(0.51)	(0.35)	(-0.84)
Asset Tangibility	6.95***	6.63***	5.78	4.47	-17.68	2.22	-0.04	0.25	-0.32	0.59	1.14**	-0.59
	(3.23)	(2.99)	(1.41)	(1.56)	(-1.52)	(0.74)	(-0.10)	(0.63)	(-0.49)	(1.15)	(2.05)	(-1.01)
Firm Size	0.26	0.22	1.10*	-0.29	12.35***	0.65	0.07	0.08	0.14	-0.01	0.05	0.13
	(0.70)	(0.58)	(1.81)	(-0.50)	(3.38)	(1.26)	(0.92)	(0.93)	(1.04)	(-0.08)	(0.37)	(1.17)
Profitability	-5.23	0.14	-27.09**	8.61	0.87	8.72	4.50***	4.34***	4.51**	4.30***	4.97***	3.66**
	(-0.85)	(0.02)	(-2.30)	(1.04)	(1.29)	(1.00)	(4.35)	(4.14)	(2.43)	(3.29)	(3.17)	(2.46)
R&D Expenditure	-5.23	-3.38	-7.25	-22.74	-2.44	-16.59	-5.25**	-6.91**	-7.49*	-6.03*	-4.50	-10.86**
	(-0.39)	(-0.24)	(-0.40)	(-0.81)	(-0.23)	(-0.80)	(-2.04)	(-2.58)	(-1.76)	(-1.68)	(-1.27)	(-2.48)
R&D Dummy	-0.47	-0.64	0.01	-1.69*	-19.00	-0.81	-0.03	-0.08	0.05	-0.14	0.03	-0.25
	(-0.72)	(-0.93)	(0.01)	(-1.76)	(-0.95)	(-0.83)	(-0.24)	(-0.61)	(0.26)	(-0.81)	(0.20)	(-1.27)
Altman's z-Score	-0.32	-1.01**	0.01	-1.61**	-2.23*	-1.71**	-0.18**	-0.13	-0.01	-0.20	-0.22	-0.02
	(-0.78)	(-2.02)	(0.02)	(-2.25)	(-1.90)	(-2.29)	(-2.22)	(-1.46)	(-0.11)	(-1.59)	(-1.64)	(-0.16)
Asset Maturity	0.06	0.03	-0.07	0.15**	-0.81	0.20**	-0.02*	-0.03**	-0.05**	-0.01	-0.05***	-0.01
	(1.19)	(0.47)	(-0.67)	(1.99)	(-1.02)	(2.44)	(-1.69)	(-2.39)	(-2.62)	(-0.60)	(-3.03)	(-0.60)
Capital Expenditure	-5.79	-7.57	27.45	-10.01	-0.19**	-5.78	-1.49	-1.32	5.67**	-4.42**	-3.58*	0.91
	(-0.77)	(-0.99)	(1.60)	(-1.09)	(-2.23)	(-0.58)	(-1.04)	(-0.92)	(2.06)	(-2.64)	(-1.82)	(0.42)
Market-to-Book	-0.05	-0.20	0.42	-1.21**	6.94	-1.14**	-0.10	-0.10	-0.09	-0.11	-0.16	-0.05
	(-0.14)	(-0.53)	(0.76)	(-2.15)	(0.52)	(-2.09)	(-1.24)	(-1.25)	(-0.62)	(-1.04)	(-1.50)	(-0.36)
Book Leverage	0.14	-1.42	5.05	-1.94	0.23	-0.61	1.32***	1.20***	1.73***	0.82	1.47**	0.31
	(0.06)	(-0.57)	(1.40)	(-0.54)	(0.40)	(-0.17)	(3.12)	(2.80)	(2.70)	(1.38)	(2.63)	(0.44)
Inverse Mill's Ratio	-3.20**	-3.34**	-8.42***	-0.60	-5.84	-5.85***	-1.17**	-1.39**	-2.57**	-0.20	-0.62	-2.64***
	(-2.00)	(-2.06)	(-3.07)	(-0.26)	(-1.52)	(-2.65)	(-2.07)	(-2.09)	(-2.38)	(-0.23)	(-0.62)	(-2.85)
Intercept	25.80***	24.97***	24.61	22.67	-4.78	28.29	-0.53	-0.82	0.87	-2.08	-2.58	0.70
	(3.21)	(3.00)	(1.62)	(1.47)	(-0.27)	(1.53)	(-0.36)	(-0.38)	(0.34)	(-0.70)	(-1.08)	(0.28)
Year & Location & Ratings Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	-	Yes	Yes	Yes	Yes	Yes	-	Yes	Yes	Yes	Yes	Yes
Pseudo R-squared	0.0162	0.0181	0.0308	0.0284	0.0379	0.0243	0.0594	0.0621	0.0810	0.0625	0.0790	0.0688
Number of Observations	947	947	490	457	375	572	1,309	1,309	660	649	699	610

Table VIII
Market Leverage

This table reports the results of firm-fixed effect estimation of the firm's (market) leverage choice model as a function of the bond turnover and a set of control variables. Panel A presents the results of the baseline model using the original bond turnover measure as an independent variable. The dependent variable is the firm's market leverage, defined as the firm's total debt divided by its market value of assets. All the independent variables are lagged values measured in the previous year; their definitions are found in the Appendix.

In column (1), the model does not include industry dummies but the errors are clustered at the two-digit SIC-code industry level. In column (2), the model includes two-digit SIC industry dummies and the errors are clustered at the firm level. Columns (3)-(8) present the results of the model for various subsamples to test our fourth hypothesis (*H2b*), namely that the sensitivity of the firm's leverage is higher the more likely a credit imbalance is. In columns (9)-(10), we examine our fifth hypothesis (*H5*), i.e., the sensitivity of the firm's leverage is higher the more financially constrained the firm is. All of the specifications include year dummies, location dummies and credit rating dummies. The symbols *, **, and *** indicate statistical significance of the test that the coefficient is different from 0 at the 10%, 5%, and 1% level, respectively, using heteroscedasticity-robust standard errors with *t*-statistics given in parentheses.

Panel A: Baseline Model

	Full Sample		Home Area Ownership		Investor Herding		Geographic Clustering		Payout Ratio	
Independent Variables			High	Low	High	Low	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Bond Turnover	-0.09***	-0.09***	-0.10***	-0.06	-0.12***	-0.05	-0.09***	-0.09**	-0.06	-0.11***
	(-2.82)	(-3.55)	(-2.92)	(-1.55)	(-3.46)	(-1.29)	(-2.73)	(-2.20)	(-1.59)	(-3.11)
Control Variables										
Bond Flow	0.03	0.03*	0.04	0.03	0.01	0.04*	0.05**	-0.01	0.03	0.02
	(1.39)	(1.95)	(1.58)	(1.56)	(0.74)	(1.72)	(2.43)	(-0.35)	(1.43)	(1.16)
Bond Holding Fraction	-0.01	-0.01	-0.02	-0.01	-0.02	0.00	-0.03	-0.00	-0.01	-0.01
	(-0.74)	(-0.72)	(-0.70)	(-0.40)	(-0.90)	(-0.01)	(-0.93)	(-0.07)	(-0.66)	(-0.22)
Stock Turnover	-0.06	-0.05	-0.10	-0.04	-0.03	-0.08	-0.09	-0.06	-0.04	-0.09
	(-1.44)	(-1.04)	(-1.47)	(-0.48)	(-0.45)	(-1.11)	(-1.18)	(-0.85)	(-0.54)	(-1.08)
Stock Flow	-0.30***	-0.30***	-0.19	-0.37**	-0.32*	-0.29*	-0.29*	-0.24	-0.20	-0.38**
	(-2.98)	(-2.65)	(-1.26)	(-2.22)	(-1.95)	(-1.72)	(-1.80)	(-1.66)	(-1.45)	(-2.22)
Stock Holding Fraction	0.05***	0.05***	0.05**	0.05**	0.04*	0.07***	0.08***	0.02	0.05**	0.07***
	(3.94)	(3.16)	(2.07)	(2.32)	(1.67)	(3.00)	(3.12)	(0.95)	(2.40)	(2.80)
Abnormal Return	-0.05***	-0.05***	-0.06***	-0.04***	-0.05***	-0.04***	-0.04***	-0.05***	-0.06***	-0.04***
	(-9.13)	(-7.52)	(-6.50)	(-4.37)	(-6.26)	(-3.98)	(-4.91)	(-5.91)	(-6.64)	(-4.63)
Amihud's Illiquidity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-0.28)	(-0.32)	(-0.46)	(0.24)	(0.39)	(0.04)	(-0.71)	(-0.65)	(0.25)	(-1.45)
Stock Return Volatility	0.03	0.04	0.16*	-0.11	0.03	0.04	-0.06	0.11	0.08	-0.02
	(0.32)	(0.55)	(1.88)	(-1.12)	(0.29)	(0.37)	(-0.81)	(1.02)	(0.64)	(-0.21)
Asset Tangibility	0.10*	0.10*	0.03	0.10	0.08	0.05	0.04	0.15*	0.03	0.13
	(1.87)	(1.80)	(0.39)	(1.29)	(1.02)	(0.65)	(0.51)	(1.72)	(0.44)	(1.51)
Firm Size	0.04***	0.04***	0.01	0.06***	0.02	0.06***	0.03	0.05***	0.04**	0.03*
	(3.75)	(2.77)	(0.61)	(3.99)	(0.94)	(4.22)	(1.61)	(2.83)	(2.17)	(1.81)
Profitability	-0.23***	-0.23***	-0.34***	-0.12	-0.17*	-0.29***	-0.12	-0.36***	-0.25**	-0.17*
	(-2.98)	(-3.26)	(-3.14)	(-1.23)	(-1.74)	(-2.82)	(-1.26)	(-3.28)	(-2.45)	(-1.82)
R&D Expenditure	-0.17	-0.17	-0.14	0.03	-0.17	-0.10	-0.07	-0.46	-0.11	-0.12
	(-1.32)	(-1.07)	(-0.68)	(0.12)	(-1.09)	(-0.25)	(-0.53)	(-1.61)	(-0.50)	(-0.78)
R&D Dummy	-0.03	-0.03	-0.00	-0.05**	-0.01	-0.04*	-0.03	-0.03	-0.04	-0.00
	(-1.36)	(-1.37)	(-0.02)	(-2.18)	(-0.32)	(-1.71)	(-0.98)	(-1.23)	(-1.61)	(-0.02)
Altman's z-Score	-0.02*	-0.02**	-0.00	-0.04***	-0.02*	-0.01	-0.02	-0.02	-0.04***	-0.02
	(-1.91)	(-2.30)	(-0.32)	(-2.95)	(-1.67)	(-1.12)	(-1.64)	(-1.66)	(-3.08)	(-1.29)
Asset Maturity	0.00	0.00	-0.00*	0.00	-0.00	0.00	0.00	0.00	0.00	0.00
	(-0.08)	(-0.39)	(-1.85)	(0.83)	(-0.68)	(0.34)	(-0.19)	(-0.36)	(-0.13)	(-0.15)
Capital Expenditure	-0.05	-0.04	0.09	-0.10	-0.01	-0.02	-0.11	0.05	-0.05	-0.03
	(-0.82)	(-0.48)	(0.64)	(-0.98)	(-0.09)	(-0.22)	(-1.00)	(0.47)	(-0.42)	(-0.28)
Market-to-Book	-0.01	-0.01**	-0.01	-0.01*	-0.00	-0.02***	-0.01	-0.01*	-0.00	-0.01**
	(-1.57)	(-2.02)	(-1.58)	(-1.86)	(-1.23)	(-2.94)	(-1.39)	(-1.82)	(-0.36)	(-2.00)
Industry Book Leverage	0.17***	0.17***	0.12**	0.20***	0.15**	0.16***	0.15**	0.15**	0.07	0.20***
	(3.80)	(4.15)	(2.06)	(3.54)	(2.49)	(2.72)	(2.58)	(2.56)	(1.36)	(3.36)
Intercept	-0.14	-0.20	0.17	-0.25*	0.38*	-0.28	-0.07	-0.21	0.30*	0.03
	(-1.21)	(-1.27)	(0.90)	(-1.77)	(1.84)	(-1.57)	(-0.51)	(-1.31)	(1.68)	(0.14)
Year & Location & Ratings Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustering at	Industry	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Adjusted R-squared	0.8054	0.8067	0.8265	0.7937	0.8185	0.8038	0.7820	0.8434	0.8469	0.7847
Number of Observations	4,563	4,563	2,266	2,297	2,299	2,263	2,315	2,248	2,339	2,224

Panel B: Modified Model with the EF Turnover

Panel B presents the results of an alternative model where the external finance-weighted bond turnover measure is used as the key variable of interest. The EF (external-financing-weighted) Bond Turnover is defined as:

$$EFTurnover_{i,t} = \sum_{s=0}^{t} \frac{e_s + d_s}{\sum_{r=0}^{t}(e_r + d_r)} Turnover_{i,s},$$

where e_s and d_s denote net equity and net debt issues during year s. Net debt issue is the change in book assets minus the change in book equity divided by book assets. Net equity issue is the change in book equity minus the change in retained earnings divided by book assets.

	Full Sample		Home Area Ownership		Investor Herding		Geographical Clustering		Payout Ratio	
Independent Variables			High	Low	High	Low	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
EF Turnover	-0.14***	-0.14***	-0.12**	-0.12**	-	-0.09	-0.18***	-0.09	-0.08	-0.16***
	(-2.83)	(-3.44)	(-2.25)	(-1.98)	(-3.03)	(-1.55)	(-3.25)	(-1.34)	(-1.53)	(-2.72)
Control Variables										
Bond Flow	0.03	0.03**	0.04	0.04	0.02	0.04*	0.05**	-0.01	0.03	0.03
	(1.45)	(1.97)	(1.53)	(1.64)	(0.86)	(1.69)	(2.41)	(-0.34)	(1.43)	(1.17)
Bond Holding Fraction	-0.01	-0.01	-0.01	-0.01	-0.02	0.00	-0.02	-0.00	-0.01	-0.00
	(-0.70)	(-0.68)	(-0.64)	(-0.39)	(-0.84)	(0.00)	(-0.83)	(-0.13)	(-0.64)	(-0.16)
Stock Turnover	-0.06	-0.06	-0.12*	-0.03	-0.03	-0.09	-0.08	-0.07	-0.04	-0.09
	(-1.49)	(-1.10)	(-1.67)	(-0.41)	(-0.40)	(-1.19)	(-1.12)	(-1.00)	(-0.59)	(-1.12)
Stock Flow	-0.31***	-0.31***	-0.21	-0.36**	-0.33**	-0.29*	-0.30*	-0.24*	-0.22	-0.38**
	(-3.10)	(-2.74)	(-1.41)	(-2.21)	(-2.05)	(-1.74)	(-1.88)	(-1.69)	(-1.52)	(-2.22)
Stock Holding Fraction	0.05***	0.05***	0.05**	0.05**	0.04*	0.07***	0.08***	0.02	0.05**	0.07***
	(3.94)	(3.17)	(2.16)	(2.30)	(1.73)	(3.01)	(3.14)	(0.86)	(2.39)	(2.84)
Abnormal Return	-0.05***	-0.05***	-	-0.04***	-	-0.04***	-0.04***	-0.05***	-0.06***	-0.04***
	(-9.22)	(-7.45)	(-6.39)	(-4.34)	(-6.24)	(-3.92)	(-4.79)	(-5.91)	(-6.70)	(-4.55)
Amihud's Illiquidity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-0.16)	(-0.16)	(-0.38)	(0.33)	(0.42)	(0.14)	(-0.56)	(-0.59)	(0.33)	(-1.36)
Stock Return Volatility	0.03	0.03	0.16*	-0.12	0.03	0.03	-0.08	0.10	0.07	-0.03
	(0.27)	(0.46)	(1.83)	(-1.20)	(0.30)	(0.27)	(-0.94)	(0.95)	(0.62)	(-0.33)
Asset Tangibility	0.09*	0.09*	0.03	0.09	0.08	0.04	0.03	0.15*	0.03	0.12
	(1.80)	(1.71)	(0.38)	(1.19)	(1.01)	(0.55)	(0.35)	(1.72)	(0.40)	(1.44)
Firm Size	0.04***	0.04***	0.01	0.06***	0.02	0.06***	0.03	0.05***	0.04**	0.03*
	(3.73)	(2.69)	(0.61)	(3.84)	(0.87)	(4.22)	(1.51)	(2.77)	(2.20)	(1.69)
Profitability	-0.24***	-0.23***	-	-0.12	-0.17*	-0.29***	-0.13	-0.35***	-0.25**	-0.18*
	(-3.09)	(-3.35)	(-3.27)	(-1.30)	(-1.81)	(-2.80)	(-1.35)	(-3.19)	(-2.44)	(-1.92)
R&D Expenditure	-0.15	-0.15	-0.13	0.03	-0.16	-0.10	-0.05	-0.45*	-0.11	-0.11
	(-1.26)	(-1.00)	(-0.63)	(0.11)	(-1.00)	(-0.25)	(-0.39)	(-1.68)	(-0.48)	(-0.68)
R&D Dummy	-0.03	-0.03	-0.00	-0.05**	-0.01	-0.04*	-0.03	-0.03	-0.04	-0.00
	(-1.36)	(-1.36)	(-0.05)	(-2.14)	(-0.32)	(-1.72)	(-1.00)	(-1.20)	(-1.60)	(-0.02)
Altman's z-Score	-0.02*	-0.02**	-0.00	-0.04***	-0.02	-0.01	-0.02	-0.02	-0.04***	-0.01
	(-1.88)	(-2.28)	(-0.26)	(-2.92)	(-1.66)	(-1.11)	(-1.63)	(-1.63)	(-3.15)	(-1.21)
Asset Maturity	0.00	0.00	-0.00*	0.00	-0.00	0.00	0.00	0.00	0.00	0.00
	(-0.15)	(-0.47)	(-1.95)	(0.82)	(-0.72)	(0.31)	(-0.24)	(-0.43)	(-0.17)	(-0.18)
Capital Expenditure	-0.05	-0.03	0.11	-0.09	-0.01	-0.02	-0.10	0.06	-0.05	-0.02
	(-0.70)	(-0.39)	(0.74)	(-0.91)	(-0.06)	(-0.14)	(-0.89)	(0.51)	(-0.40)	(-0.20)
Market-to-Book	-0.01	-0.01**	-0.01	-0.01*	-0.00	-0.02***	-0.01	-0.01*	-0.00	-0.01**
	(-1.61)	(-2.07)	(-1.58)	(-1.93)	(-1.36)	(-2.91)	(-1.44)	(-1.79)	(-0.36)	(-2.07)
Industry Book Leverage	0.17***	0.17***	0.12**	0.20***	0.14**	0.16***	0.15**	0.15**	0.07	0.20***
	(3.86)	(4.17)	(2.10)	(3.53)	(2.40)	(2.75)	(2.57)	(2.52)	(1.37)	(3.32)
Intercept	-0.11	-0.19	0.18	-0.48***	0.43**	-0.21	0.13	-0.18	0.31*	0.08
	(-0.97)	(-1.19)	(0.93)	(-3.39)	(2.02)	(-1.14)	(0.85)	(-1.17)	(1.76)	(0.44)
Year & Location & Ratings Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustering at	Industry	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Adjusted R-squared	0.8055	0.8068	0.8260	0.7941	0.8184	0.8040	0.7830	0.8429	0.8469	0.7847
Number of Observations	4,563	4,563	2,266	2,297	2,299	2,263	2,315	2,248	2,339	2,224

Table IX
Book Leverage

This table reports the results of firm-fixed effect estimation of the firm's (book) leverage choice model as a function of the bond turnover and a set of control variables. Panel A presents the results of the baseline model using the original bond turnover measure as an independent variable. The dependent variable is the firm's book leverage, defined as the firm's total debt divided by its book value of assets. All the independent variables are lagged values measured in the previous year; their definitions are found in the Appendix.

In column (1), the model does not include industry dummies but the errors are clustered at the two-digit SIC-code industry level. In column (2), the model includes two-digit SIC industry dummies and the errors are clustered at the firm level. Columns (3)-(8) present the results of the model for various subsamples to test our fourth hypothesis (*H2b*), namely that the sensitivity of the firm's leverage is higher the more likely a credit imbalance is. In columns (9)-(10), we examine our fifth hypothesis (*H5*), i.e., the sensitivity of the firm's leverage is higher the more financially constrained the firm is. All of the specifications include year dummies, location dummies and credit rating dummies. The symbols *, **, and *** indicate statistical significance of the test that the coefficient is different from 0 at the 10%, 5%, and 1% level, respectively, using heteroscedasticity-robust standard errors with *t*-statistics given in parentheses.

Panel A: Baseline Model

	Full Sample		Home Area Ownership		Investor Herding		Geographical Clustering		Payout Ratio	
Independent Variables			High	Low	High	Low	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Bond Turnover	-0.05***	-0.05**	-0.06**	-0.03	-0.07***	-0.00	-0.05*	-0.05*	-0.02	-0.06**
	(-3.31)	(-2.31)	(-2.26)	(-0.86)	(-2.85)	(-0.13)	(-1.93)	(-1.69)	(-0.60)	(-2.27)
Control Variables										
Bond Flow	0.02**	0.03**	0.03	0.03*	0.02	0.03	0.04**	0.01	0.03	0.02
	(2.46)	(2.07)	(1.43)	(1.83)	(1.56)	(1.13)	(2.44)	(0.49)	(1.55)	(1.43)
Bond Holding Fraction	-0.01	-0.01	-0.02	-0.01	-0.02	-0.01	-0.01	-0.01	-0.02	-0.01
	(-1.46)	(-1.09)	(-1.25)	(-0.27)	(-1.05)	(-0.49)	(-0.75)	(-0.42)	(-1.13)	(-0.28)
Stock Turnover	-0.00	0.01	-0.01	0.02	0.01	-0.01	0.01	-0.02	-0.00	-0.01
	(-0.10)	(0.23)	(-0.15)	(0.31)	(0.21)	(-0.30)	(0.17)	(-0.35)	(-0.05)	(-0.12)
Stock Flow	-0.20**	-0.19**	-0.13	-0.23**	-0.18	-0.17	-0.18	-0.17	-0.13	-0.25**
	(-2.26)	(-2.37)	(-1.03)	(-1.99)	(-1.57)	(-1.37)	(-1.66)	(-1.21)	(-1.21)	(-2.04)
Stock Holding Fraction	0.03**	0.03**	0.05**	0.01	0.01	0.06***	0.04**	0.02	0.03*	0.04**
	(2.39)	(2.29)	(2.39)	(0.88)	(0.52)	(2.86)	(2.22)	(1.07)	(1.73)	(2.01)
Abnormal Return	-0.01***	-0.01***	-0.02***	-0.01**	-0.01***	-0.02**	-0.01*	-0.02***	-0.02***	-0.01**
	(-3.41)	(-3.34)	(-2.66)	(-2.38)	(-2.68)	(-2.23)	(-1.75)	(-3.20)	(-2.77)	(-2.12)
Amihud's Illiquidity	0.00**	0.00**	0.00**	0.00	0.00	0.00	0.00	0.00	0.00	0.00**
	(-2.16)	(-2.00)	(-1.96)	(-1.03)	(-1.08)	(-1.09)	(-1.20)	(-1.39)	(-0.17)	(-2.64)
Stock Return Volatility	0.02	0.03	0.04	-0.00	0.03	0.02	0.01	0.05	-0.04	0.02
	(0.28)	(0.46)	(0.53)	(-0.07)	(0.39)	(0.22)	(0.12)	(0.58)	(-0.48)	(0.32)
Asset Tangibility	0.03	0.03	-0.00	0.02	0.05	-0.03	-0.01	0.07	0.03	-0.00
	(0.92)	(0.82)	(-0.01)	(0.46)	(0.97)	(-0.64)	(-0.16)	(1.21)	(0.65)	(-0.07)
Firm Size	-0.00	-0.01	-0.01	-0.00	-0.01	-0.00	-0.01	-0.01	-0.00	-0.01
	(-0.74)	(-0.99)	(-1.14)	(-0.19)	(-0.91)	(-0.38)	(-0.86)	(-0.68)	(-0.39)	(-0.65)
Profitability	0.01	0.01	0.03	-0.01	0.01	0.01	0.05	-0.05	0.14	-0.04
	(0.23)	(0.18)	(0.34)	(-0.10)	(0.14)	(0.11)	(0.64)	(-0.52)	(1.66)	(-0.55)
R&D Expenditure	0.04	0.05	0.11	0.11	-0.00	0.62	0.09	-0.26	0.64	0.01
	(0.85)	(0.39)	(0.76)	(0.33)	(-0.04)	(1.22)	(0.67)	(-1.31)	(1.55)	(0.11)
R&D Dummy	-0.01*	-0.02*	-0.00	-0.03**	-0.01	-0.02	-0.03*	-0.01	-0.01	-0.01
	(-1.71)	(-1.74)	(-0.35)	(-2.07)	(-0.51)	(-1.29)	(-1.72)	(-0.94)	(-1.03)	(-0.66)
Altman's z-Score	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***	-0.03**	-0.04***	-0.02**	-0.04***	-0.03***
	(-4.18)	(-4.56)	(-3.47)	(-2.90)	(-3.77)	(-2.18)	(-3.89)	(-2.46)	(-3.43)	(-3.33)
Asset Maturity	-0.00	-0.00	-0.00**	0.00	-0.00	-0.00	-0.00	-0.00	0.00	-0.00
	(-0.72)	(-1.28)	(-2.59)	(0.86)	(-0.64)	(-1.03)	(-0.87)	(-0.94)	(-0.67)	(-0.83)
Capital Expenditure	0.00	0.00	0.04	-0.02	-0.03	0.04	-0.02	0.08	0.02	0.00
	(0.00)	(0.05)	(0.29)	(-0.31)	(-0.37)	(0.47)	(-0.24)	(0.94)	(0.19)	(0.02)
Market-to-Book	0.00	0.00	0.00	0.00	0.00	-0.00	0.00	-0.00	0.00	0.00
	(0.23)	(0.32)	(0.03)	(0.04)	(0.21)	(-0.13)	(0.60)	(-0.48)	(1.02)	(0.02)
Industry Book Leverage	0.25***	0.25***	0.23***	0.28***	0.19***	0.28***	0.27***	0.22***	0.19***	0.28***
	(8.01)	(7.88)	(5.39)	(5.57)	(4.49)	(5.74)	(5.39)	(4.92)	(4.50)	(5.82)
Intercept	0.24***	0.23*	0.21*	0.17*	0.31**	0.16	0.27**	0.20*	0.22**	0.19
	(3.02)	(1.68)	(1.79)	(1.75)	(2.53)	(1.14)	(2.32)	(1.82)	(2.25)	(1.35)
Year & Location & Ratings Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustering at	Industry	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Adjusted R-squared	0.8125	0.8139	0.8426	0.7897	0.8388	0.7909	0.8094	0.8186	0.8358	0.8060
Number of Observations	4,563	4,563	2,266	2,297	2,299	2,263	2,315	2,248	2,339	2,224

Panel B: Modified Model with the EF Turnover

Panel B presents the results of an alternative model where the external finance-weighted bond turnover measure is used as the key variable of interest. The EF (external-financing-weighted) Bond Turnover is defined as:

$$EFTurnover_{i,t} = \sum_{s=0}^{t} \frac{e_s + d_s}{\sum_{r=0}^{t}(e_r + d_r)} Turnover_{i,s},$$

where e_s and d_s denote net equity and net debt issues during year s. Net debt issue is the change in book assets minus the change in book equity divided by book assets. Net equity issue is the change in book equity minus the change in retained earnings divided by book assets.

	Full Sample		Home Area Ownership		Investor Herding		Geographical Clustering		Payout Ratio	
Independent Variables			High	Low	High	Low	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
EF Turnover	-0.06**	-0.07**	-0.09**	-0.05	-0.08**	-0.06	-0.09**	-0.07	-0.05	-0.09**
	(-2.62)	(-2.29)	(-2.28)	(-1.00)	(-2.04)	(-1.25)	(-2.16)	(-1.37)	(-1.04)	(-2.21)
Control Variables										
Bond Flow	0.03**	0.03**	0.03	0.03*	0.02	0.03	0.04**	0.01	0.03	0.02
	(2.47)	(2.08)	(1.44)	(1.84)	(1.60)	(1.23)	(2.39)	(0.53)	(1.58)	(1.44)
Bond Holding Fraction	-0.01	-0.01	-0.02	-0.01	-0.02	-0.01	-0.01	-0.01	-0.02	-0.00
	(-1.41)	(-1.06)	(-1.21)	(-0.27)	(-0.99)	(-0.48)	(-0.67)	(-0.47)	(-1.13)	(-0.23)
Stock Turnover	-0.00	0.01	-0.01	0.02	0.01	-0.02	0.01	-0.02	-0.00	-0.01
	(-0.15)	(0.18)	(-0.31)	(0.34)	(0.22)	(-0.35)	(0.22)	(-0.47)	(-0.07)	(-0.14)
Stock Flow	-0.20**	-0.20**	-0.14	-0.23**	-0.19	-0.17	-0.18*	-0.17	-0.14	-0.25**
	(-2.31)	(-2.42)	(-1.14)	(-1.99)	(-1.65)	(-1.38)	(-1.72)	(-1.22)	(-1.26)	(-2.03)
Stock Holding Fraction	0.03**	0.03**	0.05**	0.01	0.01	0.06***	0.04**	0.02	0.03*	0.04**
	(2.41)	(2.29)	(2.43)	(0.86)	(0.59)	(2.90)	(2.21)	(1.01)	(1.72)	(2.02)
Abnormal Return	-0.01***	-0.01***	-0.02**	-0.01**	-0.01**	-0.02**	-0.01	-0.02***	-0.02***	-0.01**
	(-3.37)	(-3.28)	(-2.57)	(-2.36)	(-2.63)	(-2.17)	(-1.65)	(-3.21)	(-2.77)	(-2.03)
Amihud's Illiquidity	0.00**	0.00*	0.00*	0.00	0.00	0.00	0.00	0.00	0.00	0.00**
	(-2.10)	(-1.91)	(-1.94)	(-0.97)	(-1.03)	(-1.08)	(-1.11)	(-1.35)	(-0.14)	(-2.61)
Stock Return Volatility	0.02	0.02	0.04	-0.01	0.03	0.01	0.00	0.05	-0.04	0.02
	(0.26)	(0.41)	(0.46)	(-0.10)	(0.43)	(0.10)	(0.06)	(0.52)	(-0.53)	(0.24)
Asset Tangibility	0.03	0.03	-0.00	0.02	0.05	-0.04	-0.01	0.07	0.03	-0.01
	(0.87)	(0.75)	(-0.04)	(0.40)	(1.00)	(-0.76)	(-0.27)	(1.20)	(0.61)	(-0.14)
Firm Size	-0.00	-0.01	-0.01	-0.00	-0.01	-0.00	-0.01	-0.01	-0.00	-0.01
	(-0.78)	(-1.05)	(-1.11)	(-0.27)	(-1.00)	(-0.40)	(-0.95)	(-0.70)	(-0.32)	(-0.77)
Profitability	0.01	0.01	0.02	-0.01	0.01	0.01	0.04	-0.04	0.14*	-0.04
	(0.20)	(0.14)	(0.30)	(-0.12)	(0.10)	(0.14)	(0.58)	(-0.50)	(1.70)	(-0.61)
R&D Expenditure	0.05	0.05	0.12	0.11	-0.00	0.60	0.10	-0.25	0.63	0.02
	(1.00)	(0.45)	(0.85)	(0.33)	(-0.02)	(1.18)	(0.73)	(-1.29)	(1.53)	(0.20)
R&D Dummy	-0.01*	-0.02*	-0.01	-0.03**	-0.01	-0.02	-0.03*	-0.01	-0.01	-0.01
	(-1.68)	(-1.71)	(-0.39)	(-2.03)	(-0.49)	(-1.29)	(-1.73)	(-0.92)	(-1.02)	(-0.67)
Altman's z-Score	-0.03***	-0.03***	-0.02***	-0.03***	-0.03***	-0.03**	-0.04***	-0.02**	-0.04***	-0.03***
	(-4.18)	(-4.54)	(-3.48)	(-2.88)	(-3.76)	(-2.21)	(-3.85)	(-2.48)	(-3.51)	(-3.26)
Asset Maturity	-0.00	-0.00	-0.00***	0.00	-0.00	-0.00	-0.00	-0.00	0.00	-0.00
	(-0.76)	(-1.33)	(-2.67)	(0.85)	(-0.71)	(-1.08)	(-0.90)	(-1.00)	(-0.69)	(-0.87)
Capital Expenditure	0.00	0.01	0.04	-0.02	-0.03	0.04	-0.01	0.08	0.02	0.01
	(0.08)	(0.11)	(0.37)	(-0.27)	(-0.35)	(0.56)	(-0.16)	(0.98)	(0.20)	(0.09)
Market-to-Book	0.00	0.00	0.00	0.00	0.00	-0.00	0.00	-0.00	0.00	0.00
	(0.22)	(0.29)	(0.03)	(0.03)	(0.12)	(-0.13)	(0.57)	(-0.47)	(0.99)	(-0.02)
Industry Book Leverage	0.25***	0.25***	0.23***	0.28***	0.19***	0.28***	0.27***	0.22***	0.19***	0.28***
	(7.99)	(7.86)	(5.40)	(5.56)	(4.38)	(5.80)	(5.38)	(4.87)	(4.51)	(5.75)
Intercept	0.24***	0.23*	0.25**	0.31***	0.32**	0.18	0.26**	0.35***	0.22**	0.22
	(3.08)	(1.74)	(2.20)	(3.29)	(2.62)	(1.32)	(2.13)	(3.00)	(2.30)	(1.56)
Year & Location & Ratings Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustering at	Industry	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Adjusted R-squared	0.8124	0.8139	0.8427	0.7898	0.8380	0.7913	0.8097	0.8184	0.8360	0.8060
Number of Observations	4,563	4,563	2,266	2,297	2,299	2,263	2,315	2,248	2,339	2,224

Table X Dynamic Leverage Adjustments

This table presents the result of firm fixed effect regression of the change in market (book) leverage on the target market (book) leverage adjustments and the firm's capital supply uncertainty shock in the bond market. The dependent variable is the change in market (book) leverage $L_t - L_{t-1}$ from year t-1 to year t. Bond refinancing risk shock is defined as $Turnover_{t-1} - E(Turnover_{t-1})$ where $E(Turnover_{t-1})$ is estimated as the fitted value of a firm fixed effect regression (unreported) of the bond turnover on its lagged value and the set of control variables used in the main specification (e.g., Table VIII). *The target (leverage) adjustment*$_{i,t}$ is defined as the difference between the leverage at time *t-1* and the expected level of leverage at time *t*. The expected level of leverage is constructed as the fitted value of a firm fixed effect regression (unreported) of leverage on the control variables used in the main specification.

In column (1), the model does not include industry dummies but the errors are clustered at the two-digit SIC-code industry level. In column (2), the model includes two-digit SIC industry dummies and the errors are clustered at the firm level. Columns (3)-(8) present the results of the model for various subsamples to test our fourth hypothesis (*H2b*), namely that the sensitivity of the firm's leverage is higher the more likely a credit imbalance is. In columns (9)-(10), we examine our fifth hypothesis (*H5*), i.e., the sensitivity of the firm's leverage is higher the more financially constrained the firm is. All of the specifications include year dummies, location dummies and credit rating dummies. The symbols *, **, and *** indicate statistical significance of the test that the coefficient is different from 0 at the 10%, 5%, and 1% level, respectively, using heteroscedasticity-robust standard errors with *t*-statistics given in parentheses.

Panel A: Market Leverage Adjustments

	Full Sample		Home Area Ownership		Investor Herding		Geographical Clustering		Payout Ratio	
			High	Low	High	Low	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Bond Refinancing Risk Shock	-0.07**	-0.07***	-0.09***	-0.03	-0.10***	-0.02	-0.06**	-0.07	-0.05	-0.08**
	(-2.52)	(-2.87)	(-2.76)	(-1.01)	(-3.05)	(-0.55)	(-2.10)	(-1.58)	(-1.47)	(-2.45)
Target Adjustments	0.76***	0.75***	0.81***	0.72***	0.78***	0.75***	0.81***	0.71***	0.77***	0.77***
	(26.99)	(28.44)	(23.77)	(18.42)	(25.06)	(16.42)	(23.13)	(16.01)	(17.84)	(21.26)
	0.03	0.05	0.01	-0.03	-0.01	0.05***	0.10**	0.05	0.15***	0.04
Intercept	(0.40)	(0.79)	(0.40)	(-0.99)	(-0.31)	(2.78)	(2.17)	(1.25)	(3.58)	(1.53)
	-0.07**	-0.07***	-0.09***	-0.03	-0.10***	-0.02	-0.06**	-0.07	-0.05	-0.08**
Year & Location & Ratings Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustering at	Industry	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Adjusted R-squared	0.3555	0.3488	0.4008	0.3058	0.3706	0.3443	0.3641	0.3492	0.3579	0.3593
Number of Observations	4,563	4,563	2,266	2,297	2,299	2,263	2,315	2,248	2,339	2,224

Panel B: Book Leverage Adjustments

	Full Sample		Home Area Ownership		Investor Herding		Geographical Clustering		Payout Ratio	
			High	Low	High	Low	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Bond Refinancing Risk Shock	-0.05***	-0.05**	-0.07**	-0.02	-0.08***	-0.01	-0.05**	-0.05	-0.03	-0.06**
	(-3.16)	(-2.46)	(-2.60)	(-0.76)	(-2.94)	(-0.23)	(-1.96)	(-1.55)	(-1.23)	(-2.22)
Target Adjustments	0.73***	0.72***	0.79***	0.69***	0.78***	0.69***	0.75***	0.71***	0.68***	0.78***
	(18.15)	(19.47)	(14.41)	(13.88)	(14.32)	(13.81)	(15.37)	(11.73)	(13.42)	(15.33)
Intercept	-0.00	-0.03	-0.01	-0.13***	-0.13***	-0.01	0.09*	0.06	-0.05	-0.03
	(-0.02)	(-0.26)	(-0.52)	(-6.42)	(-6.10)	(-0.23)	(1.84)	(1.32)	(-1.14)	(-0.52)
Year & Location & Ratings Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustering at	Industry	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Adjusted R-squared	0.3078	0.3018	0.3505	0.2677	0.3453	0.2753	0.3000	0.3287	0.2833	0.3238
Number of Observations	4,563	4,563	2,266	2,297	2,299	2,263	2,315	2,248	2,339	2,224

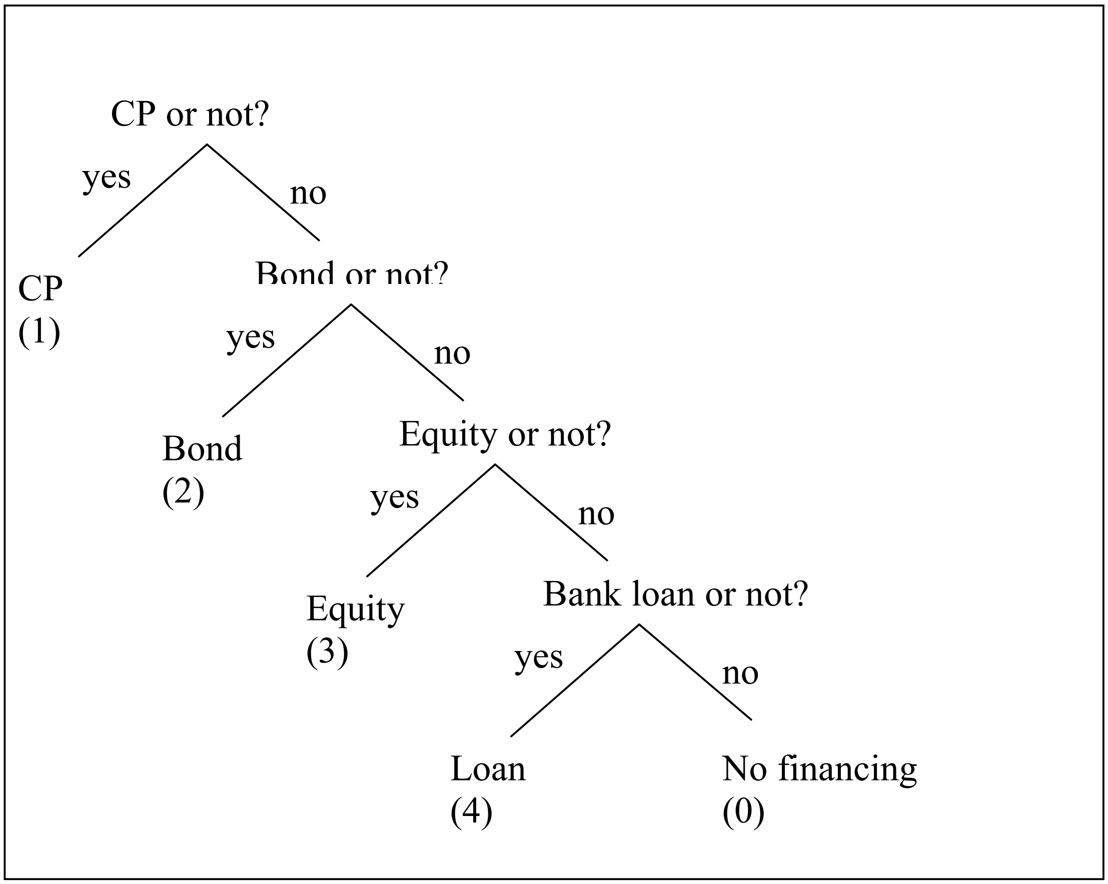

Figure 1. Decision Tree for the Multinomial Logit Model