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Too much of a good thing? A theory of short-term debt as a sorting device

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ABSTRACT

This paper shows that the liquidity risk associated with short-term debt financing can be used to sort insolvent firms out of financial markets when their solvency risk is private information. Notwithstanding this sorting role of short-term debt, unregulated financial firms tend to choose an inefficiently short debt maturity structure. This inefficiency arises for two reasons. First, by issuing more short-term debt, low-risk firms reduce their expected funding costs. This leads to a misalignment of private and social incentives as firms fail to fully internalize the social costs of becoming illiquid. Second, while the sorting role of short-term debt is reflected in a decline of long-term interest rates when more short-term debt is issued, creditors' inability to observe firms' solvency risk leads to an excessive reduction of long-term interest rates. This further distorts firms' funding choice towards short-term debt.

1. Introduction

Financial firms' liabilities tend to be of shorter maturity than their assets, leading to a maturity mismatch on their balance sheets. The liquidity risk implied by this maturity mismatch can lead to significant disruptions in financial markets when these firms fail to roll over their debt. For example, increased reliance on short-term funding is widely considered to have been a key factor responsible for the build-up of financial fragility prior to the 2007–2009 crisis (Brunnermeier, 2009). While the ex post costs implied by the drying-up of short-term funding markets are undebatable, whether fragile

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debt structures and liquidity risk constitute desirable features of well-functioning financial markets ex ante is a more contentious issue.

An influential view, dating back to Calomiris and Kahn (1991), argues that if creditors cannot observe financial firms' investment decisions, the threat of future illiquidity can prevent inefficient risk-shifting behavior. According to this perspective, short-term debt acts as a "disciplining device" in markets distorted by moral hazard frictions. Others, including Chari and Jagannathan (1988) and Goodhart (1999), argue that the cutting-off of financial firms from funding markets may be driven by creditors' doubts about borrowers' underlying solvency. Illiquidity may therefore also be interpreted as the outcome of an asymmetric information problem between lenders and borrowers. This second view suggests that if liquidity and solvency risk are positively correlated, fragile debt structures can be used to force insolvent firms out of financial markets. The question remains, however, whether short-term debt constitutes an *efficient* "sorting device."

The present paper tackles this question and argues that while liquidity risk may indeed have social value as a way to sort solvent from insolvent firms, unregulated financial firms tend to choose inefficiently short debt maturity structures. Our analysis is based on a stylized model of debt maturity choice under asymmetric information. Firms invest in long-term assets whose *solvency risk* (the probability that assets pay out at maturity) is not publicly observable, financing their investment using a mix of short- and long-term debt. Long-term debt has the same maturity as firms' assets, but its interest rate is fixed in the initial period. This leads to a mispricing loss for low-risk firms because long-term interest rates reflect the average solvency risk in the market rather than the riskiness of individual firms. Short-term debt allows low-risk firms to mitigate this loss by refinancing their short-term liabilities at more favorable terms before their assets mature. This comes at the cost of increased *liquidity risk*, as firms may fail to roll-over their short-term debt.

To highlight the sorting role of short-term debt, we assume that firms hold either "good" assets with positive net present value (NPV) or "bad" assets with negative NPV. Consequently, high-risk firms must choose the same debt maturity structure as low-risk firms if they are to receive financing (i.e. the equilibrium must be *pooling*). We then show that short-term financing may be socially desirable if firms' liquidity and solvency risk are positively correlated. In this case, the liquidity risk associated with short-term financing can be used to stochastically sort bad firms out of the market before their assets mature. The efficient allocation trades-off the gain implied by forcing negative NPV firms out of the market with the loss implied by not allowing firms with positive NPV assets to continue operating.

Notwithstanding the social value of short-term debt, the equilibrium debt maturity structure tends to be inefficiently short. This inefficiency arises for two reasons. First, since the *refinancing gain* just redistributes rents from bad to good firms, good firms fail to internalize the full costs associated with the early liquidation of positive NPV assets. Second, asymmetric information between firms and creditors, coupled with the positive correlation between liquidity and solvency risk, leads creditors to reduce long-term interest rates too much as more short-term debt is issued. In general, the negative relationship between long-term interest rates and short-term debt is desirable given that it reflects the sorting value of short-term debt. However, creditors' inability to observe firms' individual solvency risk implies that a low-risk firm marginally shortening its maturity structure sees the face-value of its long-term liabilities *decrease by more* than would occur if the price of debt reflected its true credit risk. This "excess elasticity" of long-term interest rates, together with the misalignment of private and social incentives implied by the refinancing gain, leads firms to issue too much short-term debt in equilibrium.

Our framework may apply to the debt maturity choice of financial as well as non-financial firms. That said, the model relies on three key assumptions that make us inclined to think of the firms as banks, or bank-like financial firms. First, banks finance themselves to a much greater degree via debt and have higher leverage than non-financial firms (Ozcan et al., 2012). This is reflected in our model as we do not allow firms to finance their assets using equity. Second, banks' access to wholesale funding markets gives them greater flexibility to adjust their debt maturity at low transaction costs, and firms in our model can shorten or lengthen their maturity structure at no cost. As demonstrated by Flannery (1986), transaction costs can lead firms to use their maturity choice to signal their solvency risk. The resulting separating equilibrium would fail to capture the sorting value of short-term debt. Hence, our results seem particularly relevant for financial institutions facing negligible transaction costs on