An empirical financial accelerator model: Small firms' investment and credit rationing

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Abstract

According to the financial accelerator model, a small monetary or other shock is amplified through credit market restrictions on small firms, and swings in balance sheets over the business cycle cause swings in small firms' spending. This paper incorporates these notions in an empirical model of firm behavior. We use unit transaction cost of debt and rationed credit as indicators of balance sheets and credit market conditions. Since a firm's credit may or may not be rationed, the empirical model is formulated as a multi-equation switching regression model. This model is estimated for two different groups of small firms in the machinery and equipment industry as reported in the Compustat database.
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1. Introduction

A firm's investment decisions are independent of its financing decisions when the capital market is perfect. Thus, internal and external funds are equivalent as a source of finance for investment under perfect capital market assumption. However, in the past two decades, challenges about the perfect capital market assumption have emerged from different perspectives. Capital imperfection could be a result of asymmetric information and/or contract enforcement problems. Myers and Majluf (1984) show that imperfect information in equity financing would cause investors to

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demand a premium in share purchases. As for debt financing, Stiglitz and Weiss (1981) indicate that credit rationing could occur in the loan market because of asymmetric information between lenders and borrowers. The cost of debt financing is higher than that of internal funds because the borrower has to compensate the lender for the auditing cost (Bernanke and Gertler, 1989). Furthermore, the premium on external funds increases as a firm's net worth value decreases.

The financial accelerator model (Hubbard, 1995; Bernanke et al., 1996) incorporates the financial cost differential as a channel through which monetary policy may work to impact the economy. In other words, the gap between the costs of external and internal finance could propagate monetary and other disturbances. The propagation mechanism works mostly through bank-dependent small firms (Gertler and Gilchrist, 1993) because they are sensitive to the market interest rate and bank loan availability. Thus, a small shock is amplified through the impact of a changed credit market condition on small firms, and swings in balance sheets over the business cycle cause swings in small firms' spending. There are only a few empirical studies that use firm level panel data to verify the impact of credit rationing and/or financial cost differential on firms' investment (Whited, 1992; Hu and Schiantarelli, 1998).

The purpose of this paper is to use notions of the financial accelerator model for guidance in the formulation of an empirical model of a small firm's behavior. This paper is similar to other papers in highlighting the significance of asymmetric information-induced financial cost. Nevertheless, it differs from other empirical research in the following aspects. First, both bank loan availability and firms' balance sheet status would affect firms' unit transaction costs and their credit limits which, in turn, cause changes in firms' investment behavior. In the models of Whited (1992) and Hu and Schiantarelli (1998), a firm's investment is affected by its own financial status but not by bank loan availability. Furthermore, they focused on capital but not inventory investment even though the latter played a very important role in aggregate behavior (Gertler and Gilchrist, 1994). Second, the debt constraint in this model is endogenous instead of exogenous (Whited, 1992). We assume that a firm may be debt-constrained in one period but unconstrained in another, with the firm's own activity affecting the likelihood of being in one regime or the other. Though Hu and Schiantarelli (1998) also had an endogenous constraint, their constraint was not affected by the global credit environment. Third, instead of estimating the Euler equations directly (Whited, 1992),[1] we differentiate the first-order conditions with respect to time to obtain explicit solutions for control variables. We then estimate this model with a switching regression technique. By deviating from customary model specifications and estimation methods, this paper provides a diversified insight into the financial accelerator model. Fourth, macroeconomic variables (like interest rates or bank-loan ratios) are incorporated into the data set with explicit reference to the firms' fiscal years. The annual data in a panel data set refer to the performance of firms over their fiscal year, and these fiscal years end at different calendar months.

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[1] Comparison with Hu and Schiantarelli (1998) is not available because they do not have a theoretical model.