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Trade credit versus bank credit: Evidence from corporate inventory financing☆

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ABSTRACT

In this study, I introduce capital market imperfections into a structure framework of inventory investments and investigate impacts of trade credit on firms' inventory dynamics and analyze the relationship between trade credit and bank loans. As a result, firms end up using a mix of trade credit and bank loans. I find that the use of trade credit and bank credit can be either complements or substitutes. During tight monetary periods, trade credit operates mainly as a substitute for bank borrowing while during looser monetary episodes even when the economy is weak, trade credit and bank loans are dominated by a complementary effect.

1. Introduction

Kaplan and Zingales (1997) and Cleary (1999) suggest that investment is insensitive to the interest rate changes. Blinder and Maccini (1991) state that little influence of real interest rates on investment can be found empirically. These arguments seem contrary to the credit channel hypothesis, according to which monetary policy is transmitted to the real economy through its effects on bank loans and firms' balance sheet variables. In particular, it is hypothesized that financially weak firms pay costly external finance premiums on bank loans and, thus, are highly sensitive to financial variables such as interest rate changes (Gertler, 1988; Hubbard, 1995; Kashyap & Stein, 1994).

However, one important fact overlooked in these studies, which take a broad view of credit in general and of the credit channel in particular, is when bank loans are more costly or harder to obtain and market finance is impossible, financially constrained firms can resort to another source of finance, namely trade credit, and thereby alleviate their reliance on bank loans.

Trade credit (i.e. accounts payable) comprises short-term loans extended by suppliers to their customers purchasing their products. The loan is automatically created when the customers delay payment of their bills to the suppliers. According to a Federal Reserve Board Study by Elliehausen and Wolken (1993), 15.78% of total assets of small US businesses were funded by trade credit in 1993. Similarly, Rajan and Zingales (1995) state that in 1991, funds loaned to customers represented 17.8% of total assets for US firms, 22% for UK firms, and more than 25% for countries such as Italy, France, and Germany. Finally, Kohler, Britton, and Yates (2000) document that during the period 1983–1995, 55% of the total short-term credit received by UK firms took the form of trade credit. It is possible, therefore, that when bank lending declines in a period of tight money, firms increase their use of trade credit to remain liquid.

The hypothesis that trade credit can weaken the traditional credit channel and substitute bank loans was first suggested by Meltzer (1960). Jaffee and Russell (1976) who observed that credit constrained firms made greater use of trade credit when credit conditions were tighter. Nielsen (2002) looked at a longer period and argued that the use of trade credit as a substitute for bank credit was prominent in the U.S. for both small- and large firms with no access to open market credit. De Blasio (2003) using Italian data shows some weak evidence that firms substitute trade credit for bank credit during periods of monetary tightening. Guariglia and Mateut (2006) use error-correction inventory investment equations to test for the existence of a trade credit channel of transmission of monetary policy and suggest that both the credit and the trade credit

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channels operate in the UK and the latter channel tends to weaken the former. Love, Prevo, and Sarria-Allende (2007) report that immediately after a monetary shock or a crisis, there is an increased supply of trade credit.

Leary (2009) find that following an expansion (contraction) in the availability of bank loans, leverage ratios of bank-dependent firms significantly increase (decrease) relative to firms with bond market access. Biais and Gollier (1997) propose that firms without relationships with banks resort more to trade credit and they emphasize the monitoring advantage of suppliers in a model where banks and suppliers have different signals about the borrower's creditworthiness. Trade credit helps alleviate the adverse selection problem of banks by identifying firms with good investment opportunities.

The substitution hypothesis, however, did not remain long undisputed. Some empirical studies challenge this substitution hypothesis. Oliner and Rudebush (1996) and Gertler and Gilchrist (1994) looked at the US in the 1974–1991 period and concluded that there was no support for the substitution between trade credit and bank loans. Petersen and Rajan (1997) emphasize that trade credit should be seen primarily as providing contractual solutions to information problems concerning product quality and buyer creditworthiness. Wilner (2000) proposes that the existence of trade credit is due to a monitoring advantage that suppliers have over banks. Cunat (2007) shows that trade credit is useful in solving some of the agency problems existing between lenders and borrowers that stem from the relative illiquidity of intermediate goods. He reports that suppliers are willing to lend under conditions when banks are not willing to. This argument suggests that extension of trade credit reveals possession of information by suppliers on a borrowing firm's financial soundness. After observing the actual use of trade credit, banks can update their prior beliefs concerning the quality of firms and thus facilitate access to bank loans, which implies a complementarity between trade credit and bank lending.

The above studies, however, generally focus on the determinants and usage of trade credit as well as its behavior over business cycles, without examining how trade credit affects real investment activities of firms. This study extends an earlier research on Guariglia (2000), who introduces capital market imperfections, with a friction generated by short-term bank credit, into a benchmark inventory investment model. In this paper, I embed both bank credit and trade credit as co-existing external sources of finance into a linear quadratic structure model of inventory and investigate the impacts of trade credit on firms' inventory investment dynamics. Moreover, I provide, for the first time, a rigorous test of the substitute and/or complementary effect between trade credit and bank credit during various monetary episodes.

Three reasons justify my focus on inventory investment. First, inventory movements play a major role in business cycle fluctuations especially during economic downturns (Blinder & Maccini, 1991). Second, inventory investments are mostly financed by trade credit and short-term bank debt (Petersen & Rajan, 1997; Valderrama, 2003). Given their high liquidity and low adjustment costs, inventory investments are likely to be more sensitive to financial variables like trade credit and bank loans than physical investment and R&D investment (Carpenter, Fazzari, & Petersen, 1994). Third, trade credit, operating as a buffer, can smooth out a part of production variations and maintain economic stability (Petersen & Rajan, 1997). These facts attracted my attention to inventory investment.

On classifying firms based on indicators that distinguish a firm's likely degree of access to the public capital market, I found asymmetric inventory behavior between financially constrained and financially unconstrained firms. Applying the General Method of Moments (GMM) approach followed by Fuhrer, Moore, and Schuh (1995), the empirical results show that small firms and firms without bond rating are highly sensitive to financial cost variables, while large firms and firms with bond rating are insensitive. I compare the model with only bank finance to the model with bank loans and trade credit. Empirical evidence indicates that adding trade credit reduces the size and significance of the coefficients associated with bank loans. This could be seen as evidence favoring the hypothesis that the trade credit actually weakens the traditional credit channel, which consistent with previous literature. This finding suggests that trade credit can alleviate rationing of bank credit attributable to asymmetric information between banks and firms.

The unique feature of the structure model in this study is that it includes both substitutability and complementary effects through the interactions between bank loans and trade credit. This model allows bank loans and trade credit as either substitutes or complements. As a result, on the whole, firms end up using a mix of trade credit and bank debt. Empirical evidence shows that trade credit and bank loans are not perfect substitutes or complements. Trade credit and bank credit can be either complements or substitutes during different monetary episodes. During tight monetary policy periods, trade credit is a "cheaper" alternative source of bank loans. Increase in trade credit reduces the demand for bank loans. In such a case, trade credit operates mainly as a substitute for bank borrowing. However, during looser monetary episodes even when the economy is weak, trade credit is more expensive than bank debt. Thus, the extension of trade credit by suppliers to a firm can reveal information on the borrowing firm's financial soundness. Acquiring such information helps banks update their prior beliefs about default risks of a customer and can alleviate an asymmetric information problem thereby facilitating access to bank loans. Here, trade credit operates mostly as a complement to bank loans. The role of trade credit, either as a substitute for or complement to bank loans, varies over time according to credit market conditions.

The results are robust to the use of an Euler equation test and thus are not affected by misspecifications (Bond & Meghir, 1994). The findings of this study have several implications. First, it highlights the role of trade credit for corporate investments during periods of credit rationing. In particular, trade credit can help firms overcome liquidity shortages and alleviate tightening of bank credit due to asymmetric information between firms and banks thus smooth out the impacts of monetary policies of contraction. More generally, access to trade credit tempers the severity of recessions that may follow the implementation of restrictive monetary policy. Second, the study takes into account the influence of trade credit in permitting more access to bank finance and reveals the dynamic relationship, especially the substitutability and complementarity between trade credit and bank credit during various monetary episodes. Finally, from the corporate point of view, these findings suggest that financial managers should bear in mind the important informational/signaling content for corporate financing management.

The paper is organized as follows. I introduce the inventory model in Section 2. The data set is described in Section 3. The estimation routine is explained in Section 4. The empirical results are analyzed in Section 5. Section 6 illustrates the simulation of the model. Section 7 discusses and concludes the paper.

2. The model

2.1. Inventory model with bank loans and trade credit

A representative firm chooses the level of inventories, bank loans, and trade credit to maximize the present value of divi-