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INVESTIGATION OF CAUSAL RELATIONSHIP BETWEEN TRADE CREDIT AND BANK LOAN DURING 2008 FINANCIAL CRISIS

Jaleel Ahmed and Hui Xiaofeng
School of Management, Harbin Institute of Technology, Harbin 150001, P. R. China

Muhammad Usman Virk
Pakistan Institute of Development Economics, Islamabad, Pakistan

Muhammad Abdullah
College of Economics and Management, North East Agricultural University, Harbin 150030, P. R. China

Abstract

This research paper attempts to investigate the causal relationship between trade credit and bank loan during 2008 financial crisis. After collecting data from 2005 to 2011 we have used Two Stage Least Square (TSLS) estimation technique. We have found that trade credit supply and bank loan are simultaneously determined and have a complementary effect during 2008 financial crisis. On the other side trade credit demand and bank loan are simultaneously determined where bank loan causes trade credit demand to decrease. A substitution effect has been observed between trade credit demand and bank loan during 2008 financial crisis. Net trade credit and bank loan have a positive and significant impact on each other. These relationships are also remains significant as in before and after financial crisis. Financial crisis have a positive impact on trade credit supply and demand. We have also found an inverse relationship between financial crisis and bank loan.

1. INTRODUCTION

Historical financial crisis, such as of 2008, has raised different questions regarding the market operations and policies at work. Such events though are unpredictable, but researchers and policy makers used these events to make sense out of them in order to secure future transactions. Financial crisis of 2008 resulted in contraction in bank financing and thus drew attention towards the role of alternate source of financing, for example trade credit, as a day saving policy. Thus tread credit has become an important aspect of research in current financial

Corresponding author's
Name: Jaleel Ahmed
Email address: *Jaleelahmed11@yahoo.com*

management studies. Similarly, the current study focuses on causal relationship between trade credit and bank loan in three periods naming before, during and after financial crisis.

Trade credit is a contract where firms buy goods on credit form their suppliers. Suppliers perform the role of an intermediary in this whole setup as they have good access to the financial institutions and markets they can arrange finance based on their reputation and size. In light of redistribution effect Meltzer (1960) have found that suppliers extend financing in shape of trade credit to deprived firms. Basically, trade credit is a two tier contract where a non-financial firm performs two roles simultaneously. In tier 1 non-financial firm get its goods from its supplier on account and mention them as trade credit payables (TCD) in its balance sheet. In tier 2 when it has enough resources to grant goods on account to its customers then it will record these transactions as trade credit receivables (TCS) in its balance sheet. As every business have different source of financing. According to Yang (2011) trade credit is one of the expensive forms of financing for non financial firms. This study arise very few questions. First, why non-financial firms are interested to get this expensive form of financing? Second, why non-financial firms perform the role of an intermediary?

There are many theoretical and empirical implications to answer these questions. Asymmetric information is one of the reasons that why non-financial firms are interested to grant credit to their customers. Being in the same industry any supplier of the goods has better information about the market and creditworthiness of the supplier. Any financial institution may need some cost to collect information regarding interested customer but on the other hand suppliers have no need to spend any thing on information collection about the buyer. Moreover, collection of borrowed loan is very easy in case of trade credit as compare to bank loans. Suppliers has the ability to cut supplies for buyers and can force to pay on time otherwise next time he will not be able to get goods on credit. In case of default on loan a supplier can easily take hold those supplies and is able to resell them. But on the other hand banks are not able to perform such act. In addition to all justifications of granting goods on credit Petersen and Rajan (1997) argue that firms have lower screening and monitoring cost.

On the other hand buyers which do not have any kind of collateral to put forward as a security against bank loan still based on their relationship they can get financing from suppliers. They can meet their liquidity problems by accepting goods from suppliers and payments will be made on some specified future date. They have no need for proper documentation and specifying goods for business transactions with suppliers. No collateral, deferral payment during tight monetary conditions and less hassle services may formulate trade credit as an expensive form of financing.

Many empirical researches have tried to explore the relationship between bank loan and trade credit in different ways. As Meltzer (1960) have mentioned that trade credit and bank loan position as substitute of each other during monetary contraction. Taketa and Udell (2007) have also found trade credit as a substitute of other lending channels during 1990s financial crisis in Japan. On the other hand Burkart and Ellingsen (2004) have found trade credit and bank credit as complementary. Demirgüc, and Maksimovic (2001) have found trade credit and bank loan as complement which is again signal of intermediation between bank and buyers. Jain (2001) mentioned that due to lower monitoring cost suppliers is performing the job of intermediary.

Although trade credit and bank loan are independent but this question is still unclear that whether they have any kind of causal relationship and whether they place as a complementary or substitute of each other. This is the main objective of this research to investigate whether trade credit and bank credit have a causal relationship and they are simultaneously determined.

Relationship between trade credit and bank loan can be observe from Figure1. Although trade credit supply and bank loan are different in volume but are following the same pattern. Same pattern suggest a positive relation between them. As bank loan is available to suppliers they can easily perform the job of intermediary. Both curves are increasing over the time this increase

can easily be observed during the time financial crisis. As for as relationship between trade credit demand and bank loan is concerned it can observe that as bank loan increase over time trade credit demand is going to decrease. This is suggesting that presence of bank loan lessen the use trade credit. This mutually exclusive relationship is clearer during and after financial crisis. Relationship between net trade credit and bank loan is the difference between trade credit supply and demand which is exposed in panel c. Final panel d is about joint picture of the entire relationships.

Due to consequences of financial crisis it is not suitable in any case for an economy. Main problem that non-financial firms face is unavailability of short term financing from banks. In the time of financial contraction banks become more reluctant to extend short term loans to their customers.

Unavailability of short term financing can lead to a reduction in sales which would be result in decrease in cash flows. Decrease in sales is the major participant of failure of a firm and collectively end result of this failure can be seen in shape of decrease in Gross Domestic Product (GDP). Rajan and Zingales (1995) have the same opinion regarding positive relationship between firm sales and GDP.

During financial crisis trade credit always stands as a second source of short term financing for non-financial firms. Unavailability of bank loan during the times of financial contraction spins customers towards trade credit. According to the state of the economy firms adjust their share in different source of finance. Ahmed *et al.* (2014) have found that as compare to before financial crisis use of trade credit increased during 2008 financial crisis.
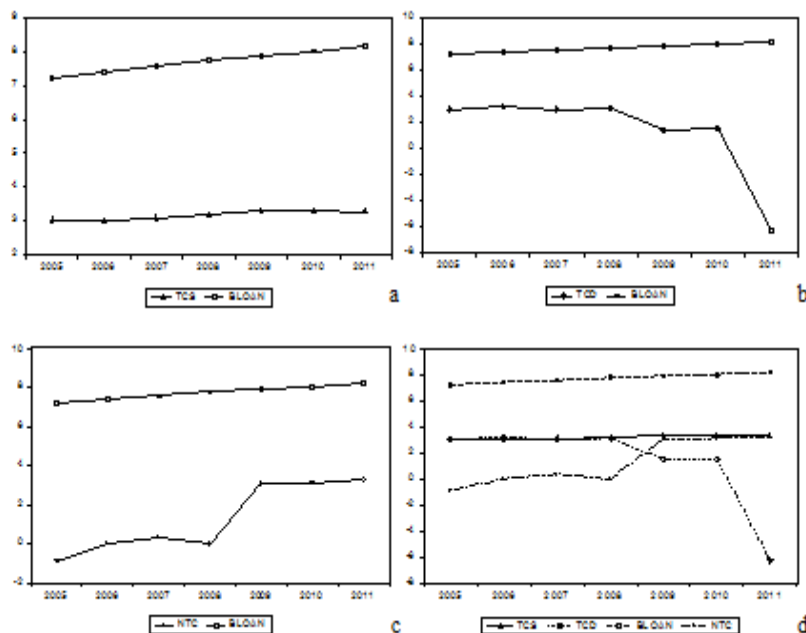

Figure 1: Trade credit and bank loan

Trade credit serves as a cushion for such financially constrained non-financial firms. Availability of trade credit from suppliers decrease the effect of unavailability of financing from other sources. Firm value of those firms have been increased which have used trade credit as a second source of finance during 2008 financial crisis Ahmed *et al.* (2014).

Remainder of the study is organized as follows. Section 2 is containing the discussion about data and results of its preliminary analysis. Section 3 is about methodology of the study. Section

4 hold the discussion about the results obtained. Finally, conclusion of the study has been presented in section 5.

2. DATA

We have collected annual data from non-financial firms of Pakistan which are listed at country's largest stock market namely, Karachi Stock Exchange (KSE). Data have been extracted from Financial Statement Analysis (FSA) published by The State Bank of Pakistan (SBP) form 2005 to 2011. To test the impact of 2008 financial crisis we have used the data from 2005 to 2011. We have then divided this interval into 3 main parts as pre financial crisis (2005-2007), during financial crisis (2008) and post financial crisis (2009-2011). Before 2011 there were 411 non-financial firms were listed at KSE. To get suitable outcomes we have excluded those firms which were unable to provide complete information on our selected variables. Due to the common practice and special nature of trade credit contracts we have excluded financial sector from our sample.

Table 1: Descriptive statistics

	Mean	Median	Minimum	Maximum	Standard deviation
TCS	0.104	0.070	0.000	0.570	0.109
TCD	0.124	0.030	0.000	0.980	0.209
NTC	-0.020	0.020	-0.940	0.570	0.235
Bank loan	10.389	2.325	0.010	187.300	23.365
Size	7.946	7.755	2.550	12.140	1.593
Inventory	0.189	0.180	0.000	0.750	0.144
Liquidity	0.057	0.020	0.000	0.850	0.097
Sales growth	0.111	0.160	-1.560	3.990	0.397
FIX	0.504	0.510	0.000	0.970	0.215
Cash	0.057	0.020	0.000	0.850	0.097

Table 1 is providing descriptive statistics for the selected sample for this study. To study the simultaneous determination of trade credit and bank loan we have used four dependent variables. Trade credit supply (TCS), the amount suppliers are willing to supply, is the ratio of account receivables to total assets. Trade credit demand (TCD), the amount of credit customers are willing to get from their suppliers, can be calculated as account payables divided by total assets. Net trade credit (NTC), tells us whether a particular firm is either trade credit giver or receiver, is the ratio of difference between account receivables and account payables to total assets. Bank loan is our fourth dependent variable which is used to determine the amount of bank loan when trade credit is used as independent variable. It can be calculated as short term debt divided by total assets. As trade credit is the source of short term financing we have also included only short term bank financing, as long term bank loans are less affected from peripheral shocks (Yang, 2011).

Size, inventory, liquidity, sales growth, fixed assets and cash are the control variables which are used in this study. Size is the measure of size of a non-financial firm which is calculated as natural log of assets. Inventory is the ratio of inventory to total assets. Liquidity measures the amount of liquid assets which are available to a firm to purchase goods and services. Liquidity is the ratio of current assets to total assets. Sales growth show the amount of sales increased in current year as compare to last year. It is calculated as sales of the current year less last year's sales divided by last year's sales. Fixed assets (FIX) over total assets show the capacity of a firm to arrange finance from bank. By keeping these fixed assets as a collateral firm can get bank loans. Cash is the one of the most liquid assets which measures the capacity of a firm to purchase goods from their suppliers. It is calculated as cash divided by total assets. All formulas and ratios which are used in this study are derived from the previous studies of Cunat (2007), Vaidya (2011), Yang (2011) and Niskanen and Niskanen (2006) on trade credit.

3. METHODOLOGY

Literature on trade credit and bank credit clearly draws inferences about their association but in doing so; previous studies have most likely ignored the problem of endogeneity that may be present in the model. For instance, Nilsen (2002) and Kohler *et al*. (2000) suggests that trade credit could be a substitute to bank credit. Moreover, Biais and Gollier (1997) postulates that those firms which have no direct access to bank credit would rely more on trade credit and their model further highlights the supplier's monitoring advantage that trade credit supplier would have on banks. All these arguments have stressed substitute effect of trade credit to bank credit but according to Yang (2011) none of the study has accounted for the likely reverse causation relationship. Yang (2011) argues that banks could take in account the information about borrowers of trade credit which they might get from the trade credit supplying firm when it extend credit to them. This would make the bank and trade credit supplier information imbalance more pronounced, and hence, could ultimately facilitates banks to grant credit to these borrowers whose creditworthiness has been revised now.

This argument leads to the conclusion that both trade credit and bank credit are endogenous variables in the model. Thus this study could not apply Ordinary Least Square (OLS) and weighted least square methods, because these methods are not able to produce consistent and unbiased estimators in the presence of correlation between explanatory variables and error term. The standard approach used in the presence of correlation between them is instrumental variable regression. By using instrument variables Two Stage Least Squares (TSLS), Limited Information Maximum Likelihood (LIML) and Generalized Method of Moments (GMM) are the available techniques that can be used to solve the problem of correlation between explanatory variables and error term in panel data.

As we have to deal with these two variables i.e. trade credit and bank loan, separately in a sense that the reverse causation would not influence the results. For this reason, both the variables have to be analyzed at the same time. Therefore, 2SLS analysis technique has been applied in this study which deals with the error term asymptotically (Sawa, 1969).

To investigate the causal relation between trade credit and bank loan we have used these simultaneous equations.

$$TCS_{it} = \alpha_0 + \alpha_1 Bankloan_{it} + \alpha_2 Pre\ Crisis\ 2_t + \alpha_3 Pre\ Crisis\ 3_t + \alpha_4 Financial\ Crisis_t + \alpha_5 Post\ Crisis\ 1_t + \alpha_6 Post\ Crisis\ 2_t + \alpha_7 Post\ Crisis\ 3_t + \alpha_8 X_{it} + \mu_i + \tau_{jt} + \varepsilon_{it} \ \ldots\ldots (1)$$

$$TCD_{it} = \beta_0 + \beta_1 Bankloan_{it} + \beta_2 Pre\ Crisis\ 2_t + \beta_3 Pre\ Crisis\ 3_t + \beta_4 Financial\ Crisis_t + \beta_5 Post\ Crisis\ 1_t + \beta_6 Post\ Crisis\ 2_t + \beta_7 Post\ Crisis\ 3_t + \beta_8 Y_{it} + \mu_i + \tau_{jt} + \varepsilon_{it} \ \ldots\ldots (2)$$

$$NTC_{it} = \gamma_0 + \gamma_1 Bankloan_{it} + \gamma_2 Pre\ Crisis\ 2_t + \gamma_3 Pre\ Crisis\ 3_t + \gamma_4 Financial\ Crisis_t + \gamma_5 Post\ Crisis\ 1_t + \gamma_6 Post\ Crisis\ 2_t + \gamma_7 Post\ Crisis\ 3_t + \gamma_8 Z_{it} + \mu_i + \tau_{jt} + \varepsilon_{it} \ \ldots\ldots (3)$$

$$Bankloan_{it} = \alpha_0 + \alpha_1 TCS_{it} + \alpha_2 Pre\ Crisis\ 2_t + \alpha_3 Pre\ Crisis\ 3_t + \alpha_4 Financial\ Crisis_t + \alpha_5 Post\ Crisis\ 1_t + \alpha_6 Post\ Crisis\ 2_t + \alpha_7 Post\ Crisis\ 3_t + \alpha_8 X_{it} + \mu_i + \tau_{jt} + \varepsilon_{it} \ \ldots\ldots (4)$$

$$Bankloan_{it} = \beta_0 + \beta_1 TCD_{it} + \beta_2 Pre\ Crisis\ 2_t + \beta_3 Pre\ Crisis\ 3_t + \beta_4 Financial\ Crisis_t + \beta_5 Post\ Crisis\ 1_t + \beta_6 Post\ Crisis\ 2_t + \beta_7 Post\ Crisis\ 3_t + \beta_8 Y_{it} + \mu_i + \tau_{jt} + \varepsilon_{it} \ \ldots\ldots (5)$$

$$Bankloan_{it} = \gamma_0 + \gamma_1 NTC_{it} + \gamma_2 Pre\ Crisis\ 2_t + \gamma_3 Pre\ Crisis\ 3_t + \gamma_4 Financial\ Crisis_t + \gamma_5 Post\ Crisis\ 1_t + \gamma_6 Post\ Crisis\ 2_t + \gamma_7 Post\ Crisis\ 3_t + \gamma_8 Z_{it} + \mu_i + \tau_{jt} + \varepsilon_{it} \ \ldots\ldots (6)$$

Where, pre crisis 2 and pre crisis 3 are dummy variables for the year 2006 and 2007. Financial crisis is a dummy variable for the year 2008. Post crisis 1, 2 and 3 are dummy variables for the year 2009, 2010 and 2011 respectively. Pre crisis 1 is a dummy variable for the year 2005 that is

used as a benchmark. X_{it}, Y_{it} and Z_{it} are vectors of other control variables for simultaneous equations include, size, inventory, liquidity, sales growth, fixed assets and cash. We have used independent variables as instruments for trade credit and bank loan equations. μ_i have been included for firm specific effects. To account for time specific effect which varies over industries we have included τ_{jt}. ε_{it} is the error term.

4. RESULTS

Results of the estimated equations 1 to 6 are reported in table 2. Panel A contain the results of equation 1 and 4 where we show the relationship between trade credit supply and bank loan. Column 1 is showing the results of equation 1 and column 2 is showing the results of equation 4. Panel B contains the information regarding causal relationship between trade credit demand and bank loan. It shows the estimated results of equation 2 and 5. Column 3 is showing the results of equation 2 and column 4 is showing the results of equation 5. Panel C is talking about causal relationship between net trade credit and bank loan. It shows the estimated results of equation 3 and 6. Column 5 is reporting the results of equation 3 and column 6 is reporting the results of equation 6.

Positive and significant values of bank loan in column 1 are indicating that trade credit supply and bank loans have a complementary effect. It means when bank loans are available then firms are more likely to grant trade credit and they increase their receivables. We can also note that trade credit supply increased during and after financial crisis. All other control variables except sales growth are significant with trade credit supply. These results are significant with the prior studies of Ahmed *et al*. (2014) and Yang (2011). Adjusted R-square for this equation 1 is 80 percent.

Results of column 2 are suggesting that bank loan are also determined with same factors and trade credit supply and bank loans are complement for each other. Because as bank loan will be available to suppliers they would be able to grant more trade credit to their customers. Dummy variable for financial crisis have a negative and significant impact on bank loan. Bank loans were not available to non-financial firms during the times of tight monetary conditions. Adjusted R-square for such regression is 85 percent which is quite satisfactory.

Column 3 in panel B is reporting that increase in bank loans causes trade credit demand to decrease. Negative and significant value for bank loan is indicating that trade credit demand and bank loans are substitute for each other. When customers are not able to arrange finance from one source of financing it is quite possible that they will move on another sources. Positive and significant results for financial crisis is indicating that in the absence of bank loans during 2008 financial crisis non-financial firms put their efforts to catch financing from their suppliers. Results for post financial crisis are advocating that non-financial firms were not able to carry out credit transactions with their suppliers and hence move on bank credit sharply. All other control variables except sales growth were insignificantly related with trade credit demand. Adjusted R-square of equation 2 is 61 percent.

Results of column 4 in panel B are also supporter of substitution effect between trade credit demand and bank loan. Bank loan is negatively and significantly determined with trade credit demand. During 2008 financial crisis commercial banks were not able to meet financing needs of non-financial firms in Pakistan. In absence of bank financing customers increase their trafficking towards trade credit. After two years from financial crisis banks were able to meet financing needs of their customers as post 3 has positive and significant impact on bank loan. As compare to other equations we get better results for equation 5 as it has 91 percent adjusted R-square.

Column 5 in panel C is reporting the results of relationship between net trade credit and bank loan. Bank loan has a positive and significant impact on net trade credit. Pre financial crisis and financial crisis dummy variables have an insignificant impact on net trade credit. It can be

Table 2: 2SLS results

	Panel A		Panel B		Panel C	
	1	**2**	**3**	**4**	**5**	**6**
C	0.494*** (0.044)	-109.113*** (8.357)	0.382** (0.170)	-73.297*** (7.461)	0.225** (0.112)	-74.546*** (6.887)
TCS		30.344*** (5.440)				
TCD				-4.438** (2.226)		
NTC						11.5091*** (2.0661)
Bank loan	0.001*** (0.0001)		-0.002** (0.0008)		0.002*** (0.0003)	
Pre 2	-0.003 (0.005)	-1.630 (1.078)	0.022 (0.016)	-0.720 (0.814)	-0.022 (0.014)	-1.004 (1.049)
Pre 3	0.001 (0.005)	-2.510** (1.102)	0.062*** (0.019)	-0.437 (0.996)	-0.005 (0.014)	-1.727 (1.076)
Crisis	0.012** (0.005)	-3.440*** (1.169)	0.080*** (0.020)	-3.606*** (0.552)	-0.010 (0.015)	-1.586 (1.125)
Post 1	0.030*** (0.005)	-3.377*** (1.215)	-0.043* (0.022)	-0.789 (1.105)	0.086*** (0.016)	-1.998* (1.167)
Post 2	0.031*** (0.006)	-3.395*** (1.262)	-0.053** (0.024)	-2.237* (1.226)	0.087*** (0.016)	-1.666 (1.204)
Post 3	0.034*** (0.006)	-2.326* (1.335)	-0.094 (0.064)	10.130*** (2.856)	0.107*** (0.017)	-0.289 (1.268)
Size	-0.036*** (0.006)	15.336*** (1.071)	-0.033 (0.022)	10.957*** (0.952)	-0.012 (0.014)	11.294*** (0.903)
Inventory	-0.225*** (0.022)	-9.820** (4.433)	-0.103 (0.099)	-9.476* (4.996)	-0.249*** (0.061)	-14.685*** (4.290)
Liquidity	-0.231*** (0.025)		-0.013 (0.081)		-0.170*** (0.063)	
Sales growth	-0.002 (0.002)		0.029** (0.014)		-0.002 (0.004)	
FIX	-0.129*** (0.015)		0.059 (0.061)		-0.167*** (0.038)	
Cash		-14.101*** (5.195)		-12.483*** (4.052)		-10.353** (4.443)
Adjusted R-Square	0.799	0.854	0.606	0.908	0.511	0.850

Coefficients are reported with standard errors in parenthesis. *** and ** are showing the significance at 1% and 5% level of significance respectively

Observe that after financial crisis overall volume of net trade credit increased. Except size and sales growth all other control variables are significant with net trade credit. Adjusted R-square for equation 3 is 51 percent.

As in column 6 bank loan is positively and significantly determined with net trade credit. No financial crisis dummy variables except post 1 are reporting an insignificant impact on bank loan. Size, inventory and cash are the control variables which have significant impact on bank loan. R-square for last equation 6 is 85 percent.

5. CONCLUSION

This study investigates the causal relationship between trade credit and bank loan. To get more appropriate results we have divided trade credit into three main categories namely, trade credit supply, trade credit demand and net trade credit. Annual data have been collected from non-financial firms of Pakistan. We have found that bank loan have a positive and significant impact on trade credit supply which indicate that presence of bank loan help suppliers to increase the volume of trade credit supply in shape of increasing the volume of account receivables. In other words a complementary effect has been found between trade credit supply and bank loan. Another substitute effect has also been observed between bank loan and trade credit demand where bank loan cause trade credit demand to decrease. Bank loan negatively and significantly determined trade credit demand. Relationship between bank loan and net trade credit has been found positive and significant. To differentiate the impact of financial crisis study has then divided the sample into three main categories of before, during and after financial crisis. Use of trade credit increased during financial crisis. Moreover, short term bank loan was available for firms to perform redistribution function. Amount of bank loan and trade credit supply increased over the time especially after the crisis. Before financial crisis trade credit demand and bank loan had a little bit similar pattern but suddenly after financial crisis presence of bank loan exclude the use of trade credit demand.

References

Ahmed, J., Xiaofeng, H., & Khalid, J. (2014). Determinants of trade credit: The case of a developing economy. *European Researcher*, 83, 1694-1706.

Biais, B., & Gollier, C. (1997). Trade credit and credit rationing. *Review of Financial Studies*, 10, 903-957.

Burkart, M., & Ellingsen, T. (2004). In-kind finance: A theory of trade credit. *The American Economic Review*, 94(3), 569-590.

Cunat, V. (2007). Trade credit: Suppliers as debt collectors and insurance providers. *Review of Financial Studies*, 21, 491-527.

Demirgüç¸ K. A., & Maksimovic, V. (2001). *Firms as financial intermediaries: Evidence from trade credit data*. Working paper. The World Banks.

Jain, N. (2001). Monitoring costs and trade credit. *Quarterly Review of Economics and Finance*, 41, 89-110.

Kohler, M., Britton, E., & Yates, T. (2000). *Trade credit and the monetary transmission mechanism*. Bank of England discussion paper, p. 115.

Meltzer, A. H. (1960). Mercantile credit, monetary policy and size of firms. *Review of Economics and Statistics*, 42, 429-437.

Nilsen, J. (2002). Trade credit and the bank lending channel. *Journal of Money, Credit and Banking*, 34(1), 226-253.

Niskanen, J., & Niskanen, M. (2006). The determinants of corporate trade credit policies in a bank-dominated financial environment: The case of Finnish small firms. *European Financial Management,* 12(1), 81-102.

Petersen, M., & Rajan, R. (1997). Trade credit: Theories and evidence. *Review of Financial Studies*, 10, 661-691.

Rajan, R., & Zingales, L. (1995). What do I know about capital structure? Some evidence from international data. *Journal of Finance*, 50, 1421-1460.

Sawa, T. (1969). The exact sampling distribution of ordinary least squares and two stage least squares estimators. *Journal of the American Statistical Association*, 64, 923-937.

Taketa, K., & Udell, G. F. (2007). Lending channels and financial shocks: The case of small and medium-sized enterprise trade credit and the Japanese banking crisis. *Monetary and Economic Studies*, 25(2), 1-44.

Vaidya, R. R. (2011). The determinants of trade credit: Evidence from Indian manufacturing firms. *Modern Economy*, 2, 707-716.

Yang, X. (2011). The role of trade credit in the recent subprime financial crisis. *Journal of Economics and Business*, 63, 517-529.