Partial adjustment toward target accounts payable ratio

Ala'a Adden Abuhommous
Department of Banking and Finance, Mutah University, Karak, Jordan

Received 22 January 2017
Revised 17 May 2017
11 June 2017
Accepted 11 June 2017

Abstract

Purpose – This paper aims to test for a potential target accounts payable ratio and the determinants of accounts payable ratio.

Design/methodology/approach – The author use data from 104 firms over the period 2000-2014 and analyse these data using the system-generalised method of moments methodology.

Findings – The author find that Jordanian firms have a target accounts payable ratio and more than 65 per cent of the deviation from target is closed within a year. He find a positive impact of growth, positive growth and supply of credit on the accounts payable ratio. Furthermore, large firms use less trade credit to finance their purchases.

Research limitations/implications – A number of limitations affect this study to be considered in future research. Future researchers could cover longer period of time. To generalise the results, non-listed firms may be included in the sample.

Practical implications – In addition to extending the finance literature, this study has managerial implications regarding trade credit policy. There is strong evidence that the trade credit policy is affected by firm's access towards capital market funds. Thus, regulators and policy maker should bear in mind that the banking system should help firms to achieve their target accounts payable ratio. In addition, firm's management should be aware of the importance of trade credit to finance sales growth. All of these results should assist firm managers to find the factors that affect the target accounts payable ratio, which ultimately may affect the firm value and performance.

Originality/value – To the best of author's knowledge, this is the first study on the partial adjustment model and determinants of accounts payable in Jordan. Thus, the authors aim to contribute to the existing literature, as there are very few studies test for target trade credit policy.

Keywords Financial management, Jordan, Financial constraints, Trade credit, Working capital management, Accounts payable

Paper type Research paper

1. Introduction

Firms use trade credit (accounts payable) as a source of finance; this allows them to delay the payment for goods purchased to the future. Recently, trade credit has represented a significant portion of firms' financing resources and may be higher than any other source of funds. In the perfect capital market conditions, a firm's financing decision is irrelevant, and firms cannot increase their market value by changing the weights of the capital structure components (Modigliani and Miller, 1958). However, the market is imperfect, and there are several market imperfections – such as asymmetric information and agency conflicts – that may build some restrictions on a firm's ability to raise funds from the financial market. Several studies prove that market imperfection is relevant, and its impact on financing decisions is determined by a firm's characteristics (Jensen and Meckling, 1976; Myers and Majluf, 1984; Fazzari *et al.*, 1988). Specifically, market imperfection has an effect on a firm's financing decision for their purchases of goods and services. In all types of economies and markets, trade credit represents a significant portion of short-term finance. Evidence has been gained from market-based

International Journal of Islamic and Middle Eastern Finance and Management
Vol. 10 No. 4, 2017
pp. 484-502

1753-8394
DOI 10.1108/IMEFM-01-2017-0019

economy samples (Petersen and Rajan, 1995; Ferrando and Mulier, 2013; Tsuruta, 2015) and from bank-based market firms (Niskanen and Niskanen, 2006; García-Teruel and Martínez-Solano 2010); the same results have been found in transition economies (Delannay and Weill, 2004) and in developing countries (Ge and Qiu, 2007). Buying goods on account may be easier than using bank credit or capital market instruments, especially for financially constrained firms. However, trade credit is an expensive tool for firms to finance their purchases if the payment is made after the discount period. The cost of financing a purchase may be very high if the firm does not pay for the goods during the discount period [e.g. 2/10 net 30, effective cost is 37.2 per cent per annum, Smith (1987)]. The unstable nature of financial markets in emerging economies forces firms' managers to consider trade credit as a good substitute for bank loans. One of the main problems of capital market financing is cost and availability, where the financial market may not provide firms with their funding needs, and, in some cases may, increase the borrowing cost for firms. Furthermore, formal procedures for, and some restrictions on, bank loan approval may reduce the flexibility needed by firms to adjust their purchases of merchandise according to changes in the market.

In this study, our main concern is to discuss the trade credit policy in Jordan. At the end of 2015, trade credit represented 45 per cent of short-term liabilities and 33 per cent of total liabilities[1], which is higher than any other source of debt used. Although, trade credit represents a significant amount of funding sources, and very important area of financial management among Jordanian firms, no empirical research has examined this topic using Jordanian data. There are very few papers that analysed the working capital items in Jordan. In the Jordanian environment, Abuhommous and Mashoka (in press) examine the target accounts receivable ratio; they find that Jordanian firms have a target accounts receivable ratio and quickly move toward that target. In addition, the paper by Abuzayed (2012) examines the relationship between working capital management and Jordanian firms' performance; the results show a positive relationship between the cash conversion cycle and a firm's profitability.

We aim to fill this gap, and this study examines whether Jordanian firms have a target accounts payable level and measure the speed of moving toward this target, and we focus on examining the factors that affect this target. Furthermore, in this study, we aim to examine whether the main theories of trade credit can be applied to the Jordanian market.

Most of the previous studies based on sample from developed countries; there is very few evidence from emerging markets, the Jordanian context differs somewhat from other markets, as Jordanian firms depend heavily on banks to finance their investment, and bond market is rarely used by firms.

The main contribution of this study is that it provides additional empirical evidence regarding the accounts payable policy. The major body of accounts payable empirical research examines the static model where it is implicitly assumed that firms adjust their trade credit level instantly without bearing any cost to reach their target. However, in this study we assume that Jordanian firms partially adjust their accounts payable level because there are some costs and benefits that must be considered. Consequently, we use the partial adjustment model to explain the dynamic nature of changing the accounts payable level.

Because the variables used in this paper may simultaneously be determined and we have the heterogeneity problem between firms, we use the system-generalised method of moments (system-GMM).

We find that Jordanian firms have a target accounts payable level and bear some costs to partially move toward this target, the speed of adjustment being lower than that found in studies of developing countries; this is due to the oligopolistic financial structure, which increases the adjustment cost. Furthermore, we find that larger firms depend less on trade

credit to finance their purchases. Also, our results confirm that firms with growth opportunities and positive growth are using more trade credit to finance their growth. In addition, we find that as a firm's level of purchases increases, its trade credit also increases. Finally, the paper examines the possible effect of financial constraints on the accounts payable policy. Thus, we use the endogenous switching regression estimator to explore the financing effect on the accounts payable level.

The rest of this paper is organised as follows. Section 2 presents the theoretical background of the study. Section 3 shows the main determinants of target accounts payable and development of hypotheses. Section 4 contains the data collection and methodology. Section 5 presents the main results. Section 6 explores the financial constraints and accounts payable level. We include the conclusion in the final section.

2. Theoretical background

The financing decision is very important for any firm's management. Modigliani and Miller (1958) show that under perfect market conditions, a firm's value should not be affected by the financing decision, and changing a firm's capital structure is irrelevant. However, the market is imperfect; firms face financial constraints on raising funds from the capital market, and financial costs of funds may differ from one firm to another. Several studies show that the degree of the financial constraints is affected by the firm's characteristics (Fazzari *et al.*, 1988). Furthermore, many studies show that a firm's capital structure is affected by the firm's characteristics (Booth *et al.*, 2001). However, accounts payable is different from other financing sources because the lender is the supplier of goods for the borrower. Therefore, this unique relationship changes the way that firms look at accounts payable when deciding whether to use it as a financing tool. In addition to its financing role, accounts payable has many benefits for firms (Ferris, 1981; García-Teruel and Martínez-Solano, 2010). First, firms can match their payments to suppliers and cash received from customers, so it can reduce the disparity between cash inflow and cash outflow. Second, customers use accounts payable as a facility to assess and evaluate the quality of purchases. Finally, financially constrained firms tend to use trade credit to overcome market imperfections, where the high cost and unavailability of capital market funds can be avoided by using trade credit. Danielson and Scott (2004) found that trade credit is acting as a complement to bank loans.

2.1 Trade credit theories

In a perfect market, trade credit should not exist. Firms demand trade credit due to an asymmetric information problem and agency cost in product and financial markets (Lewellen *et al.*, 1980; Mian and Smith, 1992). Different theories have been presented to explain the demand for and supply of trade credit. In this section, we aim to provide a brief description of these theories.

First is transaction cost theory. During stable market demands, firms are more likely to purchase goods on a regular basis. Paying at each time of purchase is costly for firms. Therefore, firms that are looking for payment flexibility are paying for purchases at the end of each period, which decreases the cost of transaction (Ferris, 1981). In addition, firms can better manage their cash if they pay for purchases at predetermined dates, where firms can decrease the amount of cash reserves and match supplier payments and cash received from customers. Trade credit reduces the transaction cost associated with fluctuating sales and seasonality, where sellers cut the inventory level during low demand seasons by granting more credit to their customers. Thus, holding and financing costs of inventory would decrease.

Second, trade credit is another instrument for firms to finance their assets. Using trade credit is crucial in the presence of the asymmetric information problem in financial markets. Thus, less creditworthy firms find themselves financially constrained and their suppliers play a financing role as well as their selling role (Schwartz, 1974). There is less of an asymmetric information problem between sellers and customers; consequently, suppliers with good access to the financial market act as intermediaries between financial markets and their customers. Suppliers may use funds from the financial market to finance accounts receivable of financially constrained customers. Petersen and Rajan (1995) introduce three competitive advantages of suppliers over financial institutions financing less creditworthy customers. First, a supplier knows more about their customer's business because of the regular interaction with them. Second, a seller can observe any early warning signs of customer default and can control supplies if the customer shows negative signs of business. Finally, the liquidation cost of seized products in the case of borrower bankruptcy is lower for suppliers than financial institutions, due to ease of access for suppliers to selling points.

Third, trade credit can be used as a price discrimination tool (Brennan *et al.*, 1988; Mian and Smith, 1992). Firms with a high profit margin increase their market share and customer base by granting trade credit to customers. Creditworthy customers pay for their purchases within the discount period, where they use internal or external funds to finance their purchases. On other hand, customers with financial difficulties prefer to pay after the discount period once they have received cash from selling. Thus, trade credit changes the selling price in an indirect way, depending on a customer's financial status.

3. Determinants of target accounts payable management policy

Most previous studies have used the static model for trade credit (Petersen and Rajan, 1995; Niskanen and Niskanen, 2006). However, the static model assumes that firms are in equilibrium, where they are always at the target accounts payable ratio. The static model ignores the fact that there are some costs involved to reach the target ratio. This study is very close to the study of García-Teruel and Martínez-Solano (2010), where we use the dynamic model of accounts payable. In our dynamic model, we assume that firms bear some cost to reach the target accounts payable ratio, where being off target has costs as well. Thus, our dynamic model is more realistic and assumes that firms partially reach their target ratio. We aim to find the speed of adjustment to the target accounts payable ratio by using the partial adjustment model, where firms partially move toward their target by balancing between the costs and benefits of being on and deviating from target.

Thus, our main independent variable in this study is the lagged value of accounts payable, which measures the target accounts payable policy. The main hypothesis is, therefore, formulated as follows:

H1. Firms have target accounts payable ratio.

Therefore, we expect the target accounts payable ratio to be affected by several control variables, such as size, age, internal finance, credit availability and cost, assets maturity, sales growth and supply of trade credit. Table I shows the expected relationship between the accounts payable ratio and the explanatory variables.

3.1 Creditworthiness and access to the capital market

According to Petersen and Rajan (1995), customers with high credit quality tend to be more often offered trade credit by suppliers because these customers will be more able to repay their debt than less creditworthy customers. They measure creditworthiness by the size and age of a firm, and they argue that large and mature firms are more likely to be offered trade

credit, as these firms are well known and have a better reputation with a lower risk than small and young firms. On other hand, Niskanen and Niskanen (2006) argue that large and mature firms use less trade credit because they have good access to the capital market, and they have fewer investment opportunities than smaller and younger firms. Therefore, we expect a negative impact of the creditworthiness proxies of size and age on demand for accounts payable.

3.2 Internal financing

Myers and Majluf (1984) argue that firms follow a pecking order in their financing choice, where asymmetric information and market imperfection lead firms to use their internal sources of funds before using external sources. So, firms with a higher internal cash flow decrease their demand for accounts payable. The usual expectation is that firms with high internal funds have lower accounts payable.

3.3 Credit availability and cost

Bank loans may be a perfect substitute for accounts payable, where the availability of short-term and long-term financing can affect the demand for trade credit (Danielson and Scott, 2004). Yang (2011) proves that bank loans and trade credit are substitutes for each other in strong economies and complementary in weak economies. However, financially constrained firms may use accounts payable rather than bank loans. But Smith (1987) shows that the cost of trade credit will be very high if the firm does not pay within the discount period. Thus, firms prefer to pay at the end of the discount period. If a firm is not able to stretch its accounts payable period, then bank loans will be a good substitute. Thus, we expect the availability of bank loans to decrease the use of trade credit.

One of the most important factors that a firm can use to compare between trade credit and bank loans is their cost. Thus, when the cost of bank loans is high, firms demand more trade credit. Therefore, we expect a positive relationship between the financial cost of debt and accounts payable.

3.4 Assets maturity

Firms tend to match the maturity of financing sources – liabilities and owner's equity – with investment in assets. Therefore, firms use trade credit to finance the variable part of current cost. Myers (1977) argues that firms reduce the agency cost problem between shareholders and debt holders by matching between investment maturity and their financing resources.

Factor	Relationship with accounts payable	Explanation
Creditworthiness	Positive	More able to repay trade credit
	Negative	Have good access to funds
Internal financing	Negative	More capacity to finance purchases
Credit availability	Negative	More capacity to finance purchases
Credit cost	Positive	Trade-off between cost of debt and accounts payable
Asset maturity	Positive	Use current assets to match trade credit
Sales growth	Positive	Accounts payable to finance sales
Supply of trade credit	Positive	High purchases financed by accounts payable

Table I.
Determinants of accounts payable

Following Niskanen and Niskanen (2006) and García-Teruel and Martínez-Solano (2010), we use current assets over total assets to measure the assets maturity hypothesis. We expect firms to use trade credit to finance their short-term investment in current assets.

3.5 Sales growth

Firms with sales growth need to invest more in assets. Mairesse and Siu (1984) and Abel and Blanchard (1986) use the sales accelerator model to explain the investment behaviour of firms; they argue that firms increased their investment as their sales increased. Thus, firms use trade credit to finance the new investment in current assets. Following Petersen and Rajan (1995), we test for the impact of positive growth and negative growth. Thus, we expect firms with positive growth to demand more trade credit to finance some of their investment in current assets. We expect suppliers to shrink their willingness to offer trade credit if their customers are negatively growing.

3.6 Supply of trade credit

A high volume of purchases refers to a high level of trade credit offered by suppliers, so we control for this by including the amount of purchasing in the model (Deloof and Jegers, 1996; Niskanen and Niskanen, 2006; García-Teruel and Martínez-Solano 2010). We expect a high level of purchases to increase the demand on trade credit.

4. Method and data

4.1 Method

As presented in Section 3, we show that target trade credit policy, measured by accounts payable, is explained by several factors. Thus, target accounts payable ratio can be explained by the following variables:

$$\begin{aligned}\text{Target accounts payable} = f(&\text{Creditworthiness, Internal financing,}\\ &\text{Credit availability and cost, Assets maturity,}\\ &\text{Sales growth, Supply of trade credit})\end{aligned}$$

We use the ratio of accounts payable to total sales as a proxy for trade credit (PAY). We use two proxies to measure creditworthiness. The first proxy is SIZE of the firm, measured by the natural log of sales. The second proxy is the firm's AGE, measured by the natural log of (1 + AGE). The age of the firm is the number of years as it was established. In the first years of their life, firms tend to show high concern about their reputation, and so, to consider this nonlinear relationship between a firm's age and its credit quality, we add AGE squared to the model (AGE^2). Internal financing is measured by net income plus depreciation over total assets (CFLOW). We measure the short-term financing (STFIN) by short-term debt over total assets, and we measure the availability of long-term financing by long-term debt over total assets. We measure the cost of external financing by financial expense over short- and long-term loans minus accounts payable (FCOST). Sales growth (GROWTH) is measured by $sales_t$ minus $sales_{t-1}$ over $sales_{t-1}$ (Deloof and Jegers, 1999; Niskanen and Niskanen, 2006). To test the impact of positive and negative sales growth, we multiply the sales by dummies, where positive growth (PGROWTH) is the variable GROWTH multiplied by 1 if the value of growth is positive and multiplied by zero otherwise. We measure negative growth (NGROWTH) by multiplying the variable GROWTH by 1 if its value is negative, and zero otherwise. Credit supply is measured by the ratio of purchases to total assets. We use the ratio of current assets over total assets to measure the assets maturity (CRASSETS). PURCH

is purchases over total assets. To control for possible outliers, we re-estimate the model, where all key variables are winsorised at 1 per cent from low and high values; the results are qualitatively similar.

The speed of adjustment toward the target credit policy ratio can be presented as follows:

$$PAY_{i,t} - PAY_{i,t-1} = \delta\left(PAY^{*}_{i,t} - PAY_{i,t-1}\right) \tag{1}$$

where, PAY is the accounts payable ratio, and δ is the change of the accounts payable ratio relative to the target ratio, with a value of between 0 and 1.

$PAY^{*}_{i,t}$ is the target accounts payable ratio estimated from the following equation:

$$PAY^{*}_{i,t} = \beta' X_{i,t} + u_{i,t} \tag{2}$$

$X_{i,t}$ is a vector of explanatory variables used to predict the accounts payable ratio.

$u_{i,t}$ is the error term.

If we substitute for $PAY^{*}_{i,t}$ in equation (1) and rearrange the terms, our estimation model of speed of adjustment becomes:

$$PAY_{i,t} = (1-\delta)PAY_{i,t-1} + \delta\beta' X_{i,t} + F_i + \gamma_t + \varepsilon_{i,t} \tag{3}$$

The speed of adjustment is measured by δ, which is equal to 1 minus the coefficient of $PAY_{i,t-1}$, where the adjustment cost is inversely related to the value of δ. If δ is close to 1, the speed of adjustment is high and firms move toward the target ratio quickly because the adjustment cost is too low and $PAY^{*}_{i,t} = PAY_{i,t}$. When δ is 0, it means that firms are not moving toward the target ratio and $PAY_{i,t} = PAY_{i,t-1}$. F_i represents the time-invariant unobservable firm-specific effect, and γ_t the time-specific effect. As suggested by Hsiao (1985), the ordinary least squares (OLS) estimator is biased because the correlation between the unobservable firm-specific effect F_i and other independent variables in the model is non-zero. In addition, the OLS estimator will provide inconsistent results because the lagged value of the dependent variable $PAY_{i,t-1}$ is correlated with the F_i that is constant. If we take the first difference the firm-specific effect F_i is eliminated. However, the correlation between $\varepsilon_{i,t}$ – $\varepsilon_{i,t-1}$ and $PAY_{i,t-1}$ – $PAY_{i,t-2}$ cannot be removed because there is correlation between $\varepsilon_{i,t-1}$ and $PAY_{i,t-1}$, which leads to the endogeneity problem. In addition, the endogeneity problem arises because all of the independent variables used in the model are simultaneously determined. Arellano and Bond (1991) propose the difference-GMM estimator where the unobserved firm-specific effect is removed by taking the first difference. Furthermore, to overcome the endogeneity problem that appears due to the correlation between $\varepsilon_{i,t-1}$ and $PAY_{i,t-1}$, they used additional instruments that resulted from using the orthogonality conditions that exist between disturbances and the lagged values of the dependent variable, where valid instruments correlated with the independent variables but not with the error term. However, Blundell and Bond (1998) prove that the instruments resulting from difference-GMM may suffer from the weak instrument problem, if the time dimension of the panel is short and the time series is persistent. The weak instrument problem arises because the instruments are only weakly correlated with the endogenous explanatory variable. Blundell and Bond (1998) combine the moment conditions for the differenced model with those for the levels model, and they call it the system-GMM estimator. They document that the lagged first-differenced and lagged levels instruments are part of the instrument set, which

estimates a system of two simultaneous equations; the first equation is the levels equation where the lagged value of the first difference of the independent variables is used as an instrument, and the other equation is the first difference where the lagged levels of the independent variables are used as instruments. Here the system-GMM treats this system as a single-equation estimation problem. In a small sample, they prove that the system-GMM has more precision and is less biased. The system-GMM is more efficient if we use a two-step estimator than using a one-step estimator[2]. In this study, we have a small sample, and therefore the estimated asymptotic standard error of the two-step estimator is downward biased. So, we apply the two-step system-GMM with corrected standard error using the method proposed by Windmeijer (2005). However, the two-step system-GMM estimator suffers from the problem of having many instruments, where the number of instruments is high relative to the number of cross sections. To avoid this problem, we do not use all available instruments. For consistent and correctly specified estimation from the system-GMM estimator, we should use valid instruments, where these instruments should not correlate with the error term. We apply the Hansen-J test, which examines the validity of the used instruments, under the null hypothesis that the instruments are uncorrelated with error term. Furthermore, if the errors $\varepsilon_{i,t}$ are correlated over time in the dynamic model, the GMM estimator is inconsistent, and thus, it is important to test for serial correlation. In particular, serially uncorrelated errors $\varepsilon_{i,t}$ should have first-order serial correlation but not higher than that, where $\Delta\varepsilon_{i,t}$ are correlated with $\Delta\varepsilon_{i,t-1}$ but not with $\Delta\varepsilon_{i,t-k}$ for k ≥ 2. We test for first-order (AR 1) and second-order (AR 2) serial correlation using the test proposed by Arellano and Bond (1991), under the null hypothesis that there is no serial correlation.

4.2 Data

Our sample consists of all publicly traded non-financial Jordanian firms listed at the Amman Stock Exchange for the period 2000-2014. Our data from annual financial statements were taken from Osiris, which was developed by Bureau Van Dijk. Thus, our final sample contains 104 firms for the period 2000-2014.

Table II shows a common size balance sheet of our sample. We can see that average accounts payable to total assets in the sample is 12.44 per cent, which represents a significant amount of a firm's financing resources. It is higher than any other source of debt finance (either short-term or long-term), where the percentage is 7.55 and 8.58 for credit banks and long-term loans, respectively, indicating that accounts payable is considered a good source of finance. At the start (in 2000), accounts payable represents 14.4 and 39 per cent of total assets and current assets, respectively. These ratios show a downward trend until 2007, when, after the global financial crisis of 2007-2008, they start to go upward; the highest ratio was in year 2014. This shift in slope indicates that before the financial crisis firms tended to use less trade credit to finance their purchases and made more use of bank loans. However, after the financial crisis banks started to impose more restrictions on loans to firms, especially on long-term finance, and consequently firms began to shift toward trade credit finance. The percentage of accounts payable to total debt trends downward between 2000 and 2007, and trends upward from 18 per cent in 2007 to reach 33 per cent in 2014, which also indicated the importance of accounts payable as a source of finance. Table IV shows the descriptive statistics of the sample, the PAY ratio is around 0.155. This also confirms the economic importance of accounts payable.

Table II. Balance sheet for all firms in the sample for 2000-2014. The value of each item is calculated as the sum of all firms averaged by total assets for all firms in each year. The sample contains 104 non-financial firms listed on the Amman stock exchange

Assets (Jordanian dinar)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Average
Cash on hand and at banks	7.3	7	7.4	8.8	11.8	12.4	13.5	10.9	11	10.73	10.32	11.92	9.59	9.9	8.4	10.06
Accounts receivable, net	12.4	10.3	10.9	10.6	10.4	12.7	11.1	12	14.5	12.37	15.81	19.83	20.74	24.2	26.25	14.94
Short-term investments	0.1	0.2	0.2	0.3	0.5	2.6	1.6	1.2	0.7	0.56	0.34	0.41	0.31	0.28	0.27	0.64
Inventory	11.6	11.8	12.6	11.2	11.9	7.3	11.6	11.5	11.4	11.16	11.26	11.56	12.7	11.35	10.26	11.28
Other current assets	5.3	5.8	5.7	7	6.3	12.8	8.8	10.9	9.5	5.9	5.88	5	5.02	3.52	3.33	6.72
Total current assets	36.7	35.1	36.8	37.8	40.9	47.8	46.6	46.5	47.1	40.72	43.61	48.72	48.36	49.25	48.51	43.63
Total assets	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Liabilities and owner's equity																
Liabilities (Jordanian Dinar)																
Accounts and notes payable	14.4	12.7	12.6	13.4	9.8	8.4	9.3	8	9.8	12.61	10.6	14.52	16.24	16.77	17.47	12.44
Credit banks	3.4	3.5	3.6	2.9	4.4	5.6	6.2	9.8	9.5	4.78	7.97	9.92	11.92	15.02	14.74	7.55
Short-term loans	1.2	1.2	1.4	1.3	1.3	1.3	1.4	2.1	3.1	2.36	1.69	0.98	0.93	1.06	0.94	1.48
Accrued part of long-term loans	1.8	2.7	2.6	3.3	3.7	2.6	2.7	1.4	2.4	2.7	1.55	1.4	1.45	1.88	1.86	2.27
Other current liabilities	3.9	3.3	2.8	1.4	1.7	1	1.7	1.8	1.8	8.03	10.17	8.29	5.89	5.27	6.02	4.2
Total current liabilities	24.7	23.4	22.9	22.5	20.8	18.9	21.3	23.1	26.6	30.47	31.98	35.11	36.43	40	41.03	27.95
Long-term loans	10.5	11.2	11.5	10	10.2	9	10.8	12.7	10.2	7.31	6.56	4.68	4.97	5	4.14	8.58
Corporate bonds	4.8	3.3	4.4	4.2	4.9	3.7	1.5	1.1	0.4	0.2	0.47	0.2	0.16	0.17	0.1	1.97
Other liabilities	8.2	8.2	8.6	8.9	11.9	12.1	10.3	6.6	6.4	8.08	5.93	6.83	6.42	6.39	6.95	8.12
Total liabilities	48.2	46.1	47.5	45.6	47.8	43.6	44	43.5	43.6	46.06	44.94	46.81	47.99	51.57	52.23	46.63
Total shareholders' equity	51.8	53.9	52.5	54.4	52.2	56.4	56	56.5	56.4	53.94	55.06	53.19	52.01	48.43	47.77	53.37
Total liabilities and shareholders' equity	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Accounts payable/current assets(%)	39	36	34	35	24	18	20	17	21	31	24	30	34	34	36	30
Accounts payable/current liabilities(%)	58	54	55	60	47	44	44	35	37	41	33	41	45	42	43	45
Accounts payable/total debt(%)	30	28	27	29	21	19	21	18	22	27	24	31	34	33	33	27

Table III shows the correlation between the coefficients of the variables. The highest correlation is between PURCH and PAY (correlation = 0.4633) which indicates the importance of the firm's purchases on the demand for accounts payable. Also, we find a positive relationship between PAY and SIZE, STFIN, FCOST and CRASSETS. PAY has a negative correlation with CFLOW, LTDEBT and GROWTH. We can see that the correlation between variables is low, indicating the multicollinearity problem does not exist. In addition, the variance inflation factor was examined to test for multicollinearity. The test result was 1.19, indicating, as it is below 10, that the multicollinearity problem does not exist (Table IV).

5. Results

The results in Table V show the Hansen-J test for validity of the instruments. The *p*-value is higher than 10 per cent which suggests that the instruments are not correlated with the error term. The *p*-value of the AR 2 test is less than 5 per cent which suggests that our models are well specified.

The coefficient of the lagged value of the dependent variable PAY_{t-1} is positive and statistically significant at 1 per cent. This is consistent with *H1* that the dynamic model is the best for modelling accounts payable adjustment. Thus, the static model is not realistic, and Jordanian firms have a target accounts payable ratio and partially move toward this target. The value of this coefficient is about 35 per cent, and thus the adjustment speed δ is

	PAY	SIZE	CFLOW	STFIN	LTDEBT	FCOST	GROWTH	CRASSETS	PURCH
PAY	1.000								
SIZE	0.129	1.000							
CFLOW	−0.013	0.018	1.000						
STFIN	0.119	0.005	−0.088	1.000					
LTDEBT	−0.067	0.165	−0.062	−0.032	1.000				
FCOST	0.012	−0.007	0.012	−0.037	−0.036	1.000			
GROWTH	−0.035	−0.033	−0.014	−0.036	−0.029	0.007	1.000		
CRASSETS	0.135	0.151	0.226	0.226	−0.259	0.006	−0.062	1.000	
PURCH	0.463	0.150	0.013	0.252	0.159	0.013	−0.031	0.368	1.000

Note: See Section 4.1 for variables definition

Table III. Correlation matrix between coefficients

Variable	Mean	Median	Perc. 25	Perc. 75
PAY	0.055	0.038	0.018	0.070
SIZE	16.93	16.81	16.012	17.74
AGE	29.80	23	20	39
CFLOW	0.057	0.109	0.027	0.236
STFIN	0.816	0.371	0.24	0.624
LTDEBT	0.054	0.075	0	0.752
FCOST	0.271	0.064	0	0.101
GROWTH	0.119	0.057	−0.083	0.201
CRASSETS	0.441	0.440	0.258	0.753
PURCH	0.469	0.366	0.186	0.60

Note: See Section 4.1 for variables definition

Table IV. Descriptive statistics

Model	1	2
PAY_{t-1}	0.34*** (3.93)	0.352*** (4.09)
SIZE	−0.02** (−2.35)	−0.018** (−2.39)
AGE	−0.177 (−1.29)	−0.124 (−0.82)
AGE^2	0.02 (1.35)	0.0198 (0.86)
GROWTH	0.041* (1.71)	
NGROWTH		−0.032 (−0.56)
PGROWTH		0.057** (2.38)
CFLOW	0.001 (0.03)	0.0043 (0.96)
STFIN	0.106 (1.29)	0.061 (0.71)
LTDEBT	0.104 (1.38)	0.076 (0.99)
FCOST	0.0067 (0.73)	0.003 (0.46)
PURCH	0.069*** (2.56)	0.08*** (2.69)
CRASSETS	−0.04 (−1.13)	−0.063 (−1.40)
AR(1)	P = 0.029	P = 0.005
	Z = −2.18	Z = −2.78
AR(2)	P = 0.547	P = 0.273
	Z = −0.60	Z = −1.10
J-TEST	Chi2(27) = 28.3	Chi2(26) = 25.78
	P = 0.396	P = 0.475

Notes: Estimates of the basic regression specification

$$PAY_{i,t} = (1-\delta)PAY_{i,t-1} + \delta\beta' X_{i,t} + F_i + \gamma_t + \varepsilon_{i,t} \quad (3)$$

See Section 4.1 for variables definition. All of estimations have been carried out using two-step system-GMM z-statistics in brackets, Two-step results using robust standard errors corrected for finite samples (using Windmeijer's, 2005, correction). *AR(i)* is a serial correlation test of order i using residuals in first differences, asymptotically distributed as N(0,1) under the null of no serial correlation. J-test is a test of the over-identifying restrictions, asymptotically distributed as x^2 under the null, degrees of freedom in brackets. ***, ** and * indicate coefficient is significant at 1, 5 and 10% level, respectively. The system-GMM estimator uses a lag length of 2 and 4 for instruments in the first-differenced equations and a lag length of 1 in the level equations

Table V.
Determinants of accounts payable, dependent variables: $PAY_{t,i}$

65 per cent per year, which suggests that Jordanian firms have a target accounts payable level, and it takes about one and a half years to adjust the deviation toward this target.

Firms with high creditworthiness would have good access to funds from financial markets. The results confirm this hypothesis; we find the coefficient of the firm size is statistically significant and has a negative impact on the demand for trade credit. Thus, firms can use financial markets to finance purchases. This finding is consistent with Delannay and Weill (2004) and García-Teruel and Martínez-Solano (2010). However, we find no evidence to support that the variables AGE and AGE^2 can affect the accounts payable ratio; the sign of these two variables was as we expected, but not statistically significant.

The demand for credit from suppliers is affected by a firm's growth, as they need new investment. We find that the coefficient of GROWTH is positive and statistically significant; this confirms that growth firms are more likely to finance part of their new investment using trade credit. In addition, we find that the coefficient of positive growth is statistically significant and positive, which supports our hypothesis that firms tend to ask for more trade credit to finance their expansion, and suppliers are more willing to offer trade credit to growth firms because they trust them more. However, we find no evidence to support that negative growth can affect the trade credit offered by suppliers. The result for the availability of internal finance (CFLOW) is positive but not statistically significant at any conventional level. The results also show that the availability and cost of external finance

have no effect on the accounts payable level, where the coefficients of variables STFIN, LTDEBT and FCOST are not statistically significant. The coefficient of supply of trade credit measured by purchases (PURCH) is positive and statistically significant. The results confirmed our expectations that a firm increases its level of purchasing as the supply of trade credit increases. Empirically, this finding is consistent with the findings of Niskanen and Niskanen (2006) and García-Teruel and Martínez-Solano (2010).

Finally, the variable CRASSETS is negative but not significant, in contrast to the results of Petersen and Rajan(1995) and Niskanen and Niskanen (2006). Thus, we find that Jordanian firms are not using trade credit to finance their current assets. García-Teruel and Martínez-Solano (2010) find the same results and conclude that the substitution effect between accounts payable and bank loans explains why firms do not only depend on trade credit to finance their current assets.

6. Financial constraints and accounts payable policy

Most of the previous studies find that a firm's characteristics are important determinants of the firm's credit policy. One of the factors that affect a firm's demand for accounts payable is its ability to access capital markets. Therefore, financially constrained firms may demand more trade credit to finance their purchases. The degree of the financing constraints is highly affected by the asymmetric information problem, whereby it is assumed that firms have more information than capital market participants. Thus, investors may not provide firms with the required amount of money to finance their investment. In competitive capital markets, Greenwald *et al.* (1984) show that credit rationing may occur if there is asymmetric information between firms and funds providers. Hence, the availability of funds may affect the firm's investment level. Many studies have examined the impact of financial constraints on firm investment (Fazzari *et al.*, 1988; Hovakimian and Titman, 2006; Almeida and Campello, 2007). These studies use a proxy to measure the unobservable financial constraints, where this proxy is used to divide firms into financially constrained and financially unconstrained firms. In this study, we will use three dividing criteria to segment firms. First scheme – Fazzari *et al.* (1988) proposed that firm size can affect the firm's accessibility to the financial markets, where they assume that large firms are less financially constrained because they have better access to the capital market. Therefore, we rank firms based on their size (total assets), where we consider firms that have a value above the sample median to be financially unconstrained firms, and firms with a value lower than the sample median to be financially constrained firms. Second scheme – previous studies have found that mature firms have a long relationship with capital market participants; hence, these firms have lower asymmetric information. Thus, mature firms are assumed to have good access to the capital market and face lower financial constraints. We sort firms according to their age and segment firms into two groups, mature and young firms, where mature firms have a value higher than the median of the sample. Third scheme – we rank firms based on their dividend policy, where firms that are paying low dividends are assumed to be financially constrained; these firms expect to encounter some difficulties in raising money from the capital market and therefore prefer to pay low dividends (Fazzari *et al.*, 1988). Thus, following Cleary (2006), we divide firms into low dividend paying, those firms with a value lower than the sample median, and high dividend paying, those with a value higher than sample median. Table VI shows the univariate analysis to measure if there were significant differences between the explanatory variables studied in relation to the scheme that each firm was assigned to. For this purpose, we performed a *t*-test of the

Table VI.
Test of mean differences between constrained and unconstrained firms

Variables	Firm size Small	Firm size Large	*t*-test *t*	*t*-test *p-value*	Firm age Young	Firm age Mature	*t*-test *t*	*t*-test *p-value*	Dividend payout ratio Low payout ratio	Dividend payout ratio High payout ratio	*t*-test *t*	*t*-test *p-value*
PAY	0.055	0.055	0.156	*0.875*	0.052	0.058	−1.636	*0.11*	0.056	0.053	1.045	*0.296*
SIZE					16.87	16.986	−1.428	*0.153*	16.82	17.16	−3.99	*0.000*
AGE	3.30	3.31	−0.378	*0.704*					3.292	3.356	−2.11	*0.034*
AGE^2	11.10	11.30	−1.032	*0.302*					11.07	11.48	−2.00	*0.050*
GROWTH	0.108	0.128	−0.669	*0.503*	0.147	0.091	1.905	*0.06*	0.145	0.062	2.609	*0.010*
CFLOW	0.018	0.089	−1.721	*0.09*	0.010	0.096	−2.065**	*0.039*	0.070	0.022	1.090	*0.275*
STFIN	0.668	0.963	−1.170	*0.242*	0.148	0.508	2.547**	*0.012*	0.074	0.065	1.351	*0.176*
LTDEBT	0.032	0.075	−7.83***	*0.000*	0.059	0.050	1.580	*0.114*	0.070	0.021	1.120	*0.262*
FCOST	0.328	0.221	0.577	*0.556*	0.257	0.288	−0.161	*0.871*	0.269	0.282	−0.064	*0.948*
PURCH	0.482	0.476	0.198	*0.842*	0.411	0.543	−4.331***	*0.000*	0.680	0.693	−0.790	*0.429*
CRASSETS	0.503	0.385	0.15***	*0.000*	0.410	0.474	−4.842***	*0.000*	0.438	0.452	−0.923	*0.355*

Notes: See Section 4.1 for variables definition. *t* is the *t-test* of the mean between firms that are assumed to be financially constrained and financially unconstrained; *** , ** and * indicate that the coefficient is significant at the 1, 5 or 10% level. We rank firms based on their size (total assets), where we consider firms that have a value above the sample median as large firms, and firms with a value lower than the sample median as small. We also sort firms according to their age, and segment firms into two groups, mature and young firms, where mature firms have a value higher than the median of the sample and young firms have a value lower than the median. Third, we rank firms based on their dividend policy, where firms with a lower value than the sample median are considered low payout ratio firms, and firms with a higher than sample median are considered as high payout ratio firms

mean between firms that were assumed to be financially constrained and financially unconstrained. Most of the variables show that there are statistical differences between the explanatory variables, depending on the segmentation scheme. The differences were found in only a few variables. We further expand the analysis and run the main model in equation (3) for each group; the results in Table VII show the estimated coefficients of the explanatory variables for each group. Even though we find some differences between the estimated coefficients of the two groups, the difference of the estimated coefficients is not statistically significant at any conventional level. The method of dividing firms according to certain firm criteria is subjective, and the results may be affected by the sample splitting point (Moyen, 2004). Hovakimian and Titman (2006) use the endogenous switching regression estimator (Maddala *et al.*, 1994; Maddala, 1986). This method estimates each accounts payable regression without *a priori* separation of firms into financially constrained and unconstrained groups. The main benefit of this method is that the firm's multiple characteristics endogenously determine the probability of the firm to be financially constrained, whereas the traditional approaches of separating are using only one criterion each time. Also, it enables us to avoid using many interaction terms if we want to use more than one splitting criterion. Thus, this method assumes the model is composed of the system of three equations (estimated simultaneously):

$$PAY_{1it} = \beta_1 X_{it} + \varepsilon_{1it} \tag{4}$$

$$PAY_{2it} = \beta_2 X_{it} + \varepsilon_{2it} \tag{5}$$

$$y^*_{it} = \lambda Z_{it} + u_{it} \tag{6}$$

where PAY is the accounts payable ratio of firm i at time t, X_{it} are the explanatory variables of the accounts payable level, and ε is the error term. Equations (4) and (5) are the structural equations of the system for the accounts payable regression for financially constrained and unconstrained firms. Equation (6) is the selection equation that establishes the propensity of the firm to be in either regime 1 or regime 2. Z_{it} are the determinants of a firm's likelihood of being in Regimes 1 or 2 at time t. Observed accounts payable is given by:

$$\begin{aligned} PAY_{it} &= PAY_{1it} \text{ if } y^*_{it} < 0, \\ PAY_{it} &= PAY_{2it} \text{ if } y^*_{it} \geq 0 \end{aligned} \tag{7}$$

where y^*_{it} is a latent variable that gauges the propensity of the firm being in Regimes 1 or 2. Thus, in the endogenous switching regression estimator, firms switch from one regime to the other over time when the propensity (y^*_{it}) of being financially constrained or unconstrained reaches a certain unobservable threshold value. The parameters β_1, β_2 and λ are vectors of parameters and will be estimated via maximum likelihood. To control for the unobserved firm-specific fixed effect, all estimations are based on the first difference. Also, we add year dummies to control for the firm year-specific effect.

The results from equations (4) to (7) provide us two regimes of firms that vary according to their accounts payable policy; however, we cannot determine whether a specific firm is financially constrained[3]. The results in Table VIII show the estimations from the endogenous switching regression model. Panel A shows the results from the structural accounts payable equations for the two regimes, financially constrained and unconstrained

Table VII. Determinants of accounts payable, dependent variables: $PAY_{t,i}$

Model	Firm size: Small	Firm size: Large	Firm age: Young	Firm age: Mature	Dividend payout ratio: Low payout ratio	Dividend payout ratio: High payout ratio
PAY_{t-1}	0.317** (2.45)	0.547*** (3.93)	0.538*** (4.29)	0.377*** (5.06)	0.463** (2.38)	0.426** (2.58)
SIZE	−0.005 (−0.58)	−0.026 (−1.41)	−0.023 (−1.89)	−0.011 (−0.41)		
AGE	−0.024 (−0.09)	−0.150 (−1.58)	−0.22 (−0.50)	0.57 (0.75)		
AGE^2	0.006 (0.09)	0.022 (1.54)	0.033 (0.51)	−0.085 (−0.72)		
GROWTH	0.074* (1.92)	0.016 (0.014)	0.010 (0.73)	0.056 (1.46)	0.031 (1.23)	−0.028 (−1.40)
CFLOW	0.022 (1.50)	−0.001 (−0.73)	0.001 (0.28)	0.004 (0.35)	0.064 (0.74)	−0.008 (−0.11)
STFIN	−0.031 (−0.23)	−0.009 (−0.13)	0.033 (0.23)	0.087 (0.91)	0.062 (0.46)	0.174 (0.74)
LTDEBT	−0.176 (−1.03)	−0.016 (−0.55)	0.060 (1.11)	−0.086 (−0.68)	0.062 (0.89)	−0.190 (−0.46)
FCOST	0.002 (0.54)	−0.021 (−0.65)	0.004 (0.17)	0.001 (0.29)	−0.001 (−0.86)	0.031 (0.634)
PURCH	0.112 (1.53)	0.014 (1.43)	0.028 (1.19)	0.11** (2.30)	0.06*** (2.76)	0.191** (2.48)
CRASSETS	−0.239 (−1.66)	−0.032 (−0.71)	−0.003 (−1.01)	−0.168* (−1.82)	−0.06 (−1.31)	−0.32** (−2.05)
AR (1)	P = 0.005	P = 0.009	P = 0.001	P = 0.001	P = 0.01	P = 0.097
	Z = −2.80	Z = −2.61	Z = −3.41	Z = −0.87	Z = −2.5	Z = −1.66
AR (2)	P = 0.266	P = 0.78	P = 0.24	P = 0.87	P = 0.93	P = 0.635
	Z = −1.10	Z = −0.28	Z = −0.81	Z = −0.38	Z = −0.09	Z = −0.47
J-TEST	Chi2 (24) = 22.23	Chi2 (24) = 27.63	Chi2 (27) = 26.62	Chi2 (27) = 26.5	Chi2 (27) = 30.48	Chi2 (27) = 24.54
	P = 0.565	P = 0.276	P = 0.485	P = 0.491	P = 0.293	P = 0.22

Notes: For each group, we then estimate the regression

$$PAY_{i,t} = (1-\delta)PAY_{i,t-1} + \delta\beta' X_{i,t} + F_i + \gamma_t + \varepsilon_{i,t} \quad (3)$$

See Section 4.1 for variables definition

	Accounts payable Regime 1 (Unconstrained)		Accounts payable Regime 2 (Constrained)		*p-values* for coefficient differences
	Coefficient	*t*-statistics	Coefficient	*t*-statistics	
Panel A. Accounts payable regression					
PAY_{t-1}	0.518	14.30***	0.679	6.61***	0.380
GROWTH	0.001	0.62	0.002	0.62	0.391
CFLOW	−0.003	−3.21***	0.002	0.17	0.362
STFIN	−0.001	−0.00	0.076	1.14	0.231
LTDEBT	0.0066	0.45	0.284	2.49**	0.125
FCOST	0.0009	4.75***	0.0001	0.28	0.124
PURCH	−0.011	−1.98**	−0.013	−0.47	0.519
CRASSETS	0.003	0.40	0.152	2.46**	0.254
Panel B. The selection equation					
Model	Coefficient	*t*-statistics			
Intercept	4.31	17.30***			
SIZE	0.169	12.53***			
AGE	0.202	5.102***			
Dividend payout ratio	−0.433	−10.63***			

Notes: This table displays results from the endogenous switching regression of the accounts payable regressions. See Section 4.1 for variables definition. The regression uses the first difference, and year dummies are included. In the selection equation, the dependent variable is coded 1 for the first accounts payable regime and coded 0 for the second accounts payable regime. SIZE is the firm size, measured by the natural log of sales. The second proxy is the firm's AGE, measured by the natural log of (1 + AGE). The age of the firm is the number of years since it was established. Dividend payout ratio is the dividend paid over total income

Table VIII. Endogenous switching regression model of accounts payable regression

firms. The results show in both regimes that the lagged value of accounts payable is positively related to the accounts payable ratio, but we find no statistical difference between the estimated coefficients in the two regimes. Also, we find no evidence that the accounts payable policy is different between the two regimes, the *p*-values are higher than any conventional level. We conclude that the accounts payable policy is not affected by financial constraints. The estimates of the selection equation, demonstrated in Panel B, show that all of the splitting criteria have a significant impact on the propensity of a firm to be assigned in a certain accounts payable policy regime. Mature, larger and dividend paying firms are more likely to be in the unconstrained regime.

7. Conclusion

In recent years, capital and money markets have encountered many financial crises. The market participants lost some of their faith in the financial market as a reliable source of funds. Hence, firms began to look for alternative sources of funds to finance their purchases. Thus, buying goods on credit from sellers represented a significant part of a firm's financing policy, even though its cost, if paying after the discount period, is higher than bank loans. Firms consider trade credit as an alternative to bank loans for financing purchases for the following reasons: difficulty of accessing bank loans, lower transaction cost, reduction in information asymmetry between buyer and seller and better cash balance management. We aim in this study to provide further empirical evidence of the determinants of accounts payable in publicly traded firms, whether these firms have a target account payable ratio and to measure the speed of

adjustment toward this target. We use panel data with system-GMM estimation, which enables us to consider the problems of heterogeneity between firms, and control for the endogeneity problem between model variables. Our main finding is that Jordanian firms have a target accounts payable ratio and partially move toward this target, needing about one and a half years to achieve it, which allows us to contribute to the debate on the usefulness of the dynamic model in understanding the firm's trade credit policy.

Furthermore, we find that firms with good access to financial markets are using less trade credit. Large firms use less credit because they have better credit quality due to their reputation, and they have a lower asymmetric information problem. During a growth period, financial markets may impose constraints on firms due the agency problem. Therefore, firms prefer trade credit. We find a positive relationship between growth and positive growth with accounts payable, and no relation with negative growth. Furthermore, we find that when firms increase their purchases, they use more trade credit. We find no evidence to support that the age of firms, internal cash flow, short-term debt and the financial cost of debt affect trade credit policy. Also, we find that firms do not match their accounts payable with their current assets. This paper shows the importance of accounts payable as a financing source for firms, especially in emerging markets such as in Jordan.

In addition to extending the finance literature, this study has managerial implications regarding trade credit policy. There is strong evidence that the trade credit policy is affected by firm's access toward capital market funds. Thus, regulators and policy maker should bear in mind that the banking system should help firms to achieve their target accounts payable ratio. In addition, firm's management should be aware of the importance of trade credit to finance sales growth. All of these results should assist firm managers to find the factors that affect the target accounts payable ratio, which ultimately may affect the firm value and performance. A number of limitations affect this study to be considered in future research. Future researchers could cover longer period. To generalise the results, non-listed firms may be included in the sample.

Notes

1. Author's calculations.
2. Step GMM is too restrictive where it is efficient if the errors are homoscedastic and not correlated over time.
3. Refer (Maddala 1986) and (Hovakimian and Titman 2006) for further information about this methodology.

References

Abel, A.B. and Blanchard, O.J. (1986), "The present value of profits and cyclical movements in investment", *Econometrica*, Vol. 54 No. 2, pp. 249-273.

Abuhommous, A. and Mashoka, T. (in press), "A dynamic approach to accounts receivable: the case of Jordanian firms", *Eurasian Business Review*.

Abuzayed, B. (2012), "Working capital management and firms' performance in emerging markets: the case of Jordan", *International Journal of Managerial Finance*, Vol. 8 No. 2, pp. 155-179.

Almeida, H. and Campello, M. (2007), "Financial constraints, asset tangibility, and corporate investment", *Review of Financial Studies*, Vol. 20 No. 5, pp. 1429-1460.

Arellano, M. and Bond, S. (1991), "Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations", *The Review of Economic Studies*, Vol. 58 No. 2, pp. 277-297.

Blundell, R. and Bond, S. (1998), "Initial conditions and moment restrictions in dynamic panel data models", *Journal of Econometrics*, Vol. 87 No. 1, pp. 115-143.

Booth, L., Aivazian, V., Demirguc-Kunt, A. and Maksimovic, V. (2001), "Capital structures in developing countries", *The Journal of Finance*, Vol. 56 No. 1, pp. 87-130.

Brennan, M.J., Maksimovics, V. and Zechner, J. (1988), "Vendor financing", *The Journal of Finance*, Vol. 43 No. 5, pp. 1127-1141.

Cleary, S. (2006), "International corporate investment and the relationships between financial constraint measures", *Journal of Banking and Finance*, Vol. 30 No. 5, pp. 1559-1580.

Danielson, M.G. and Scott, J.A. (2004), "Bank loan availability and trade credit demand", *The Financial Review*, Vol. 39 No. 4, pp. 579-600.

Delannay, A. and Weill, L. (2004), "The determinants of trade credit in transition countries", *Economic Change and Restructuring*, Vol. 37 No. 3, pp. 173-193.

Deloof, M. and Jegers, M. (1996), "Trade credit, product quality, and intragroup trade: some European evidence", *Financial Management*, Vol. 25 No. 3, pp. 33-43.

Deloof, M. and Jegers, M. (1999), "Trade credit, corporate groups, and the financing of Belgian firms", *Journal of Business Finance and Accounting*, Vol. 26 Nos 7/8, pp. 945-966.

Fazzari, S.M., Hubbard, R.G. and Petersen, B.C. (1988), "Financing constraints and corporate investment", *Brookings Papers on Economic Activity*, Vol. 1988 No. 1, pp. 141-195.

Ferrando, A. and Mulier, K. (2013), "Do firms use the trade credit channel to manage growth?" , *Journal of Banking and Finance*, Vol. 37 No. 8, pp. 3035-3046.

Ferris, J.S. (1981), "A transactions theory of trade credit use", *The Quarterly Journal of Economics*, Vol. 96 No. 2, pp. 243-270.

García-Teruel, P.J. and Martínez-Solano, P. (2010), "A dynamic perspective on the determinants of accounts payable", *Review of Quantitative Finance and Accounting*, Vol. 34 No. 4, pp. 439-457.

Ge, Y. and Qiu, J. (2007), "Financial development, bank discrimination and trade credit", *Journal of Banking and Finance*, Vol. 31 No. 2, pp. 513-530.

Greenwald, B., Stiglitz, J.E. and Weiss, A. (1984), "Information imperfections in the capital market and macroeconomic fluctuations", *American Economic Review*, Vol. 74 No. 2, pp. 194-199.

Hovakimian, G. and Titman, S. (2006), "Corporate investment with financial constraints: Sensitivity investment to funds from voluntary asset sales", *Journal of Money, Credit, and Banking*, Vol. 38 No. 2, pp. 357-374.

Hsiao, C. (1985), "Benefits and limitations of panel data", *Econometric Reviews*, Vol. 4 No. 1, pp. 121-174.

Jensen, M.C. and Meckling, W.H. (1976), "Theory of the firm: Managerial behavior, agency costs and ownership structure", *Journal of Financial Economics*, Vol. 3 No. 4, pp. 305-360.

Lewellen, W.G., McConnell, J.J. and Scott, J.A. (1980), "Capital market influences on trade credit policies", *Journal of Financial Research*, Vol. 3 No. 2, pp. 105-113.

Maddala, G.S. (1986), "Disequilibrium, self-selection, and switching models", *Handbook of Econometrics*, in Griliches, Z. and Intriligator, M.D., (Eds), Elsevier Science, Amsterdam, Vol. 3, pp. 1633-1688.

Maddala, G.S., Forrest, D. and Nelson, (1994), "Switching regressions models with exogenous and endogenous switching", *Econometric Methods and Applications*, in Maddala, G.S. (Ed.), Edward Elgar, Aldershot, pp. 369-372.

Mairesse, J. and Siu, A.K. (1984), "An extended accelerator model of R&D and physical investment", *R&D Patents and Productivity*, in Griliches, Z. (Ed.), University of Chicago Press, Chicago, pp. 271-298.

Mian, S.L. and Smith, C.W. (1992), "Accounts receivable management policy: theory and evidence", *The Journal of Finance*, Vol. 47 No. 1, pp. 169-200.

Modigliani, F. and Miller, M.H. (1958), "The cost of capital, corporation finance and the theory of investment", *The American Economic Review*, Vol. 48 No. 3, pp. 261-297.

Moyen, N. (2004), "Investment–cash flow sensitivities: constrained versus unconstrained firms", *The Journal of Finance*, Vol. 59 No. 5, pp. 2061-2092.

Myers, S.C. (1977), "Determinants of corporate borrowing", *Journal of Financial Economics*, Vol. 5 No. 2, pp. 147-175.

Myers, S.C. and Majluf, N.S. (1984), "Corporate financing and investment decisions when firms have information those investors do not have", *Journal of Financial Economics*, Vol. 13 No. 2, pp. 187-221.

Niskanen, J. and 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*, Vol. 12 No. 1, pp. 81-102.

Petersen, M.A. and Rajan, R.G. (1995), "The effect of credit market competition on lending relationships", *The Quarterly Journal of Economics*, Vol. 110 No. 2, pp. 407-443.

Schwartz, R.A. (1974), "An economic model of trade credit", *Journal of Financial and Quantitative Analysis*, Vol. 9 No. 4, pp. 643-657.

Smith, J.K. (1987), "Trade credit and informational asymmetry", *The Journal of Finance*, Vol. 42 No. 4, pp. 863-872.

Tsuruta, D. (2015), "Bank loan availability and trade credit for small businesses during the financial crisis", *The Quarterly Review of Economics and Finance*, Vol. 55 No. 5, pp. 40-52.

Windmeijer, F. (2005), "A finite sample correction for the variance of linear efficient two-step GMM estimators", *Journal of Econometrics*, Vol. 126 No. 1, pp. 25-51.

Yang, X. (2011), "The role of trade credit in the recent subprime financial crisis", *Journal of Economics and Business*, Vol. 63 No. 5, pp. 517-529.

Corresponding author
Ala'a Adden Abuhommous can be contacted at: alaa_h1@yahoo.com