To Bank or Not to Bank: The Determination of Cash Holdings and Credit Lines[a]

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Abstract

This study investigates the liquidity choices of listed Jordanian firms. We focus on two liquidity resources: internal represented by cash holdings and external represented by credit lines. We document a significant substitution effect of credit lines on cash holding and we show that this effect strengthens with longer durations of credit lines. However, credit lines are not a viable liquidity substitute of cash for all firms. Firms with characteristics linked to high costs of external financing are significantly less likely to have access to credit lines. In addition, ownership of the largest owner-controller exerts a significant negative impact on the probability of obtaining a credit line. Finally, using a simultaneous equation framework to estimate the joint determination of cash and credit lines we find a significant impact of ownership of the largest owner-controller on cash holdings. This finding suggests that firms with large owner-controller pursue a liquidity policy of high cash holdings and no credit lines.

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1. Introduction

Liquid resources enable the firm to respond in a timely fashion to unexpected changes to its cash flows and/or to its set of investment opportunities (Denis, 2011). Under perfect capital market conditions, firms can adjust their capital structures to meet unexpected periods of insufficient resources. However, in the presence of financial frictions firms will face states of the world where external funds will be costly or unavailable (Myers and Majluf, 1984; Myers, 1984). Therefore, value maximizing firms can design financial policies that preserve the flexibility to respond to unexpected needs (Denis, 2011) such as stockpiling cash and obtaining credit lines. The use of cash holdings by firms as a store of liquidity has been under rigorous theoretical and empirical investigation for the past two decades (see for example Opler et al., 1999; Kim et al., 1998; Almeida et al., 2004; Acharya et al. 2007). More recently, the attention has shifted to credit lines as an alternative source of "insured liquidity" (see for example Sufi, 2009; Acharya et al., 2014; Lins et al., 2011). In this study we examine the determinants of the two liquidity sources of listed Jordanian firms with an emphasis on the role of costs of external financing and ownership concentration on these choices.

Under perfect capital market conditions, cash holdings are irrelevant because firms can raise external financing to meet unexpected changes in its cash flows or investment opportunity set at zero cost (Opler et al., 1999). However, due to transaction, information and agency costs associated with external financing cash may provide valuable financial flexibility to the firm (Opler et al., 1999, Almeida et al.; 2004; Acharya et al. 2007; Denis, 2011). This precautionary motive is more important for firms facing higher costs of external financing relative to costs of internal financing. Hence, we expect cash holdings to be influenced by the ease and cost of access to external sources of funds. Firms can have timely access to bank debt at competitive rates because banks invest in technologies that reduce transaction and information asymmetry costs (Leland and Pyle, 1977; Smith and Warner, 1979; Fama, 1985; Boyd and Prescott, 1986). Consequently, firms with credit lines are likely to accumulate lower cash holdings compared to firms without credit lines. This negative impact could represent a substitution effect between two alternative sources of liquidity, which is interesting given that a deeper banking system can offer financial products used by firms to enhance the efficiency of their financial policies. However, Berger and Udell (1995) note that credit lines represent a formalization of bank-borrower relationship. Therefore, credit lines could have a negative impact over cash holdings because of a relationship lending effect (that

strengthen the substitution effect). If the negative effect between credit lines and cash operate through a lending effect channel we expect that firms with longer durations of the credit line, a proxy of the strength of relationship lending, will accumulate significantly less cash. Firms with longer durations have formed stronger relationships with their lenders and hence will obtain credit at better terms (Berger and Udell, 1995) which reduces firms' incentives to accumulate cash. We examine the impact of the duration of credit line on cash holdings for the whole sample and for firms with credit lines and expect that duration has a negative impact on cash holdings.

The above argument suggests that credit lines are useful in providing alternative source of liquidity. However, it does not show which types of firms are likely to obtain credit lines and why. The fact that some firms do not use a credit line (around 40% of this study sample firms do not report having a credit line) suggests that there are economic reasons for why firms choose one type of liquidity source over the other. The literature on this particular issue is very recent with Sufi's (2009) being one of the first who modeled the choice between credit lines and cash holdings. In Sufi (2009) the author suggests that firms with low profitability run into the risk of breaching their covenants which in turn leads to revoking their lines of credit or reducing the amounts of credit during the times that the firm needs the funds most. Therefore, firms with low profitability find credit lines costly and hence have lower probability of obtaining credit lines. Acharya et al. (2014) propose that it is not the idiosyncratic risk identified in Sufi's (2009) that influences a firm's choice of having credit lines but rather the firm's systematic risk. The authors argue that banks price a firms' systematic risk and hence firms with large exposure to aggregate market risk find it more costly to use credit lines rather than to save cash. These two arguments concentrate on how firm risks, idiosyncratic or systematic, impact the price and availability of credit lines and hence influences a firm's decision to choose cash holdings instead. In Lins et al. (2011), the authors survey CFOs from 48 countries and show that cash reserves are used in bad times to meet negative cash flow shocks while credit lines are used in good times to meet unexpected investment opportunities.

In this article, we focus on the impact of two groups of variables on the probability of obtaining a credit line. The first group deals with firm characteristics that are likely associated with firms facing high costs of external financing, namely: cash flows, tangibility, size and book to market. The second group concern ownership of largest shareholders. We

are interested in the first group because firms facing higher costs of external financing can be "forced" out of credit line services offered by banks (Sufi, 2009). In other words, banks may be successful in resolving information asymmetry problems efficiently for a group of firms but not the ones on the extreme: small, intangible firms with low cash flows and high MTB. Hence, firms with the previous ascribed attributes may find credit lines costly.[1] From this view, credit lines could be interpreted as a sign of financial constraints. If firms still find *bank debt*, which is arguably the most efficient in resolving information asymmetries, more expensive than internal financing then these are truly constrained firms. To the extent that the cash flow sensitivity of cash reflects financial constraints (Almeida et al., 2004), we expect firms without credit lines to exhibit significantly higher sensitivity of cash to cash flows compared to firms with credit lines.

However, the above argument ignores that some firms may choose not to have a credit line due to factors not related to costs of obtaining funds. Strebulaev and Yang (2013) study zero-leverage behaviour among US firms and show that a firm's ownership structure affects the probability of having zero leverage. Therefore, we examine how ownership structure influences a firm's incentives to choose credit lines. We propose that ownership of the largest owner is negatively related to the probability of having a credit line. In case of listed Jordanian companies, the large shareholder is a controller. She is represented in the board of directors (BoD) and she forms strong ties to other members of the board (based on family, mutual business ties . . . etc) and she usually assumes the Chairman and the CEO positions. In case of the appointment of a professional manager, the largest shareholder has the power and discretion to fire the manager through the BoD. Hence, largest shareholders in listed Jordanian companies have substantial control over the firm and hence their incentives are likely to be similar to inside owners/controllers rather than blockholders/monitors. Therefore, large shareholders may show low preference to credit lines to avoid monitoring, discipline and transfer of control rights that are associated with bank lending. To test this prediction, we investigate the impact of the ownership of the largest holder on the probability of obtaining a credit line. Since our prediction of a negative relation between ownership and credit lines focuses on the argument that controlling large shareholders avoid the monitoring and disciplinary pressure of debt we would expect a negative relation between debt, regardless of

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[1] This study does not examine the costs of credit lines, however, the extant evidence shows that these include cutting funds when the firm faces a negative cash flow shock (Sufi, 2009) and adjusting the contract terms by increasing the spreads and commitment fees (Jimenez et al., 20110.

its source and maturity, and ownership. We compute the ratio of total debt and examine the impact of ownership on debt in the whole sample and among firms with and without credit lines. We expect to find a negative impact of ownership on debt. In addition, to test if the negative impact of ownership on credit lines is a demand side not supply side effect we examine the impact of ownership on the used portion of credit lines. If the negative impact is a demand side effect firms with large owner-controllers will be reluctant to use the credit line facility even if they have one. Therefore we expect a negative relationship between ownership and the used proportion of the credit line facility.

The previous discussion implies that firms with large controlling shareholders are likely to pursue a policy of no credit lines. However, it does not suggest if the level of cash holdings is going to be influenced by the ownership of large controlling shareholders. In this study we are concerned with examining the impact of ownership of the largest owner on the joint determination of the liquidity choices. In other words, we are interested in examining if firms with controlling large holders pursue a liquidity policy of zero credit lines *and* excess cash holdings. A positive relationship between ownership and cash holdings may result from the fact firms with large owners choose to avoid credit lines and compensate that by accumulating more cash. However, a simultaneous equation system should account for this. Any positive relationship in this system should be interpreted as a preference for stockpiling cash. The extant evidence suggests that there is a positive impact of inside ownership on cash holdings (Opler et al., 1999; Harford et al., 2008). This evidence is consistent with the view that managers prefer liquid assets as they are easier to divert compared to real assets (Myers and Rajan, 1998) and they are not subject to monitoring by external providers of funds and hence they allow firms the flexibility to pursue projects that may be rejected by the market (Jensen, 1986; Opler et al., 1999; Harford, 1999). As we discussed earlier, incentives of controlling large shareholders in listed Jordanian companies are likely to be similar to insiders and hence we expect a positive relationship between ownership of the largest shareholder and cash holdings. To estimate the impact of ownership on cash holdings on the joint determination of cash holdings and credit lines, we estimate a three stage least squares (3SLS) system of equations. The 3SLS methodology accounts for any correlation between the residuals of the cash holdings and credit line models that is caused by their joint determination. We also use the CMP procedure suggested by Rodman (2010) to estimate simultaneous equations with a binary model in the second stage.

Our findings show that, controlling for the size of debt, credit lines are significantly and negatively related to cash holdings. We also find that the duration of the credit line is significantly and negatively related to cash holdings. This result is present in the full sample and in the sample of firms with credit lines. The evidence indicates that credit lines provide an alternative source of liquidity hence reducing the need to accumulate cash. It also indicates that the negative effect is stronger for firms that are in lending relationships. In addition, we find that firm characteristics associated with costly external financing negatively affect the probability of having a credit line. To investigate if this finding is consistent with the hypothesis that the lack of access to credit lines is a measure of financial constraints we run regressions of cash flow sensitivity of cash using credit lines as our *priori*. We find that firms with credit lines exhibit higher positive significant sensitivity of cash to cash flows.

In addition, we examine a firm's choice between credit lines and cash holdings by examining the probability of having a credit line (note that firms without credit lines are choosing to manage their liquidity using cash reserves). We find that the probability of having a credit line is decreasing with ownership of the largest shareholder. In addition, we show that ownership of the largest shareholder is negatively related to leverage, though not significantly, for the full sample and it is negatively and significantly related to leverage for firms without credit ratings. In order to examine if this result is driven by a demand not supply side, we show that ownership is also negatively related to the used portion of the credit facility indicating that firms with large shareholders are reluctant to use credit even if they have the facility. These results show that ownership is associated with lower leverage, a result consistent with Strebulaev and Yang (2011) finding that inside ownership is positively related to zero (and almost zero) leverage. These results suggest that firms with controlling large shareholders are more likely to manage their liquidity through cash holdings not credit lines. Finally, we examine the impact of ownership of the largest shareholder on a firm's liquidity policy and we find, similar to the previous result, that ownership is significantly and negatively related to credit lines and significantly and positively related to cash holdings. This result suggests that firms with large controlling shareholder pursue a liquidity policy of low credit lines and excess cash holdings.

This study contributes to the extant literature on cash holdings and credit line determination. To the best of my knowledge this is the first study to examine the impact of credit lines on cash holdings from a relationship lending channel. Numerous studies on cash holding

determinants suspected that credit lines can have a negative impact on cash holdings as they represent an alternative liquidity source but could not examine this proposition due to data (un)availability (Olpler et al., 1999). Other studies examined the impact of bank debt on cash holdings by proposing that banks are efficient in solving information asymmetry and hence access to bank debt allows firm greater capacity of external financing (Ozkan and Ozkan, 2004; García-Teruel and Martínez-Solano, 2008). However, these studies do not specify which type or characteristics of debt have a substitution impact on cash holdings. In this study, we show that credit lines substitute cash and that relationship lending strengthens that substitution effect. In addition, this study supports Sufi's (2009) finding that "lack of access to a line of credit is a . . . measure of financial constraints" (p. 1057) using data from an emerging market. This is a useful finding given that measures of financial constraints that are used in the literature indicate difficulty in accessing capital markets. In case of Jordan, firms rarely issue new external financing through the capital market. Therefore, a measure of difficulty of access to the banking system is more applicable. Finally, to the best of my knowledge, this is the first study to examine the impact of the ownership of the largest owner-controller on access to credit lines and its overall impact of liquidity choices. There is a large body of research examining the impact of governance on cash holdings using international and country specific contexts (see for example Dittmar et al., 2003; Kalcheva and Lins, 2007; Harford et al., 2008 to name a few). However, there is little research on the impact of governance on credit lines with the exception of Yun (2009). The author examines that impact of US state-level changes in takeover protection in a firm's choices between cash and credit line and finds that cash holdings increase *relative* to credit lines when the threat of takeover weakens. Yun (2009) results indicate that managers have preference of stockpiling cash which they pursue when governance becomes weaker. In this study we examine the impact of ownership of the largest owners-controller with the view that large owners dislike debt.

In the case of Jordan, firms rarely issue new external financing through the debt market with currently one traded debt issue with a size of 25 Million JDs. On the other hand, and according to statistics issued by the Central Bank of Jordan, total deposits for 2014 with licensed banks amounted to 30.26 billion JDs (approximately $42.76). For the same year, the World Bank reports that Jordan's GDP at market prices was $35.83 billion. That is the ratio of Deposits to GDP is 1.19 times indicating the strength of the banking system in the Jordanian economy. The overall evidence shows the extent at which bank debt can influence

corporate decisions at a firm level. Specifically, the evidence shows that credit lines substitute cash holdings in maintaining a firm's financial flexibility and this effect grow stronger with relationship lending. Given the important role of bank debt, taking the influence of credit lines in facilitating a firm's financial flexibility as an example, it is essential to understand why the demand on bank debt in Jordan is small. For example, the average bank debt of listed Jordanian companies is only 15.1% (median 10.9%) out of which is 5.9% used proportion of credit lines (median 1.2%). The analysis presented in the paper suggests that some firms still find credit lines more costly than internal sources of financing. Policy makers may be concerned of how banks may increase their reach to financially constrained firms. The results of this study suggest that relationship lending could be one channel. In addition, this study shows that firms with large owner-controller follow a zero credit line policy. This finding calls for more attention towards the impact of a firm's governance on its credit policies. Is examining these issues in the context of a small emerging country relevant to other economies? We believe that the findings presented in this paper have implications for economies with banking systems that are relatively more important than their capital markets, such as Jordan. The results of this study highlights the importance of relationship lending on a firm's financial policies in a market plagued with frictions, proposes the use of lack of access of credit lines as a measure of financial constraints for countries with banking-based systems, and show how ownership structures affect firms' liquidity policies. All of these issues are relevant to other emerging markets.

The rest of this article is organized as follows. In the next section we discuss model specification. The main determinants of cash holdings and credit lines are discussed in Section 3. We present data, sample choice and descriptive statistics in Section 4. Then, we present the results and analysis in Section 5 and we conclude in Section 6.

2. Model Specification: Interplay between Cash Holdings and Credit Lines

This article focuses on examining the firm's liquidity choices and hence we could measure the relative importance of credit line to cash holdings using the ratio of the size of the credit line facility divided by the of facility and cash holdings (Sufi, 2009; Jimenez et al., 2009). However, in this study we employ credit lines to measure another economic construct, namely access to an external source of financing and the strength of that access. If firms rely on cash savings to meet unexpected funding needs instead of external financing because of

market frictions that make external funds unavailable or excessively costly, we would expect firms with access to bank debt to depend less on cash. This is because banks resolve information asymmetry problems efficiently and therefore firms with bank debt are expected to have credit terms reflecting the riskiness of their projects without additional information asymmetry premiums. Banks have access to private information (Bhattacharya and Chisea, 1995, Chemmanur and Fulghieri, 1994), and employ monitoring technologies such as debt covenants that allow banks to gain access to more inside information (Smith and Warner, 1979; Berlin and Mester, 1992; Smith, 1993). In addition, banks establish relationships with firms where a firm repeats borrowing from the same lender (Boot, 2000, Elyasiani and Goldberg, 2004, Schenone, 2009). These relationships allow banks to produce more information and refine the contract terms offered to the borrower over the course of the relationship (Berger and Udell, 1995). Therefore, the specification that includes cash holdings on the left hand side and credit lines on the right hand side is more pertinent to our study.

In this study we focus on credit lines because we are interested in a measure that potentially captures relationship-driven rather than transaction-driven bank debt. Berger and Udell (1995) argue that credit lines in comparison to other types of bank debt are a formalization of relationship lending. Ozkan and Ozkan (2004) and García-Teruel and Martínez-Solano (2008) include bank debt ratio as a proxy of access to an external source of financing, however, bank debt ratio is also a measure of leverage which is expected to be negatively related to cash holdings (see Section 3). In our specification, we employ an indicator variable that takes the value of one if the firm has a credit line and zero otherwise. We also control for leverage, which in our sample is composed entirely of bank debt. However, a negative impact of credit lines on cash holdings could indicate a substitution effect of one liquidity source over the other or a substitution effect alongside a relationship lending effect. To refine our inferences we also include a proxy of relationship lending defined as the duration of credit lines and computed as the logarithm of the number of years the firm has been using a credit line. To examine these effects we estimate a cash model specified in equation 1:

$$Cash_{it} = \lambda_1 Bank\ Access_{it} + \sum \beta_k X_{kit} + e_{it} \qquad (1)$$

where $Bank\ Access_{it}$ is approximated using *Credit Line*, an indicator variable taking the value of one if the firm has a credit line and zero otherwise, and *Duration*, which is the

logarithm of the number of periods the firm have had its credit line. X_{jit} is a vector of control variables that include the following: *CashFlow*, *MTB*, *Size*, *Volatility*, *Age*, *Dividends*, and *Capital Expenditures*. The choice of variables and their definitions is discussed in the next section.

The above argument suggests that credit lines substitute cash holdings and this substitution effect is strengthened with longer durations of credit lines. However, it does not answer an important question on which firms choose, or more importantly do not choose, to have credit lines and why. To answer these questions we examine the probability of having a credit line. We use a 0/1 indicator variable as our dependent variable because we are most interested in the studying the type of firms who are more (less) likely to choose credit lines. Our two main suspects are firms which are financially constrained and still find credit lines more costly than saving cash and firms with large owner-controllers which try to avoid debt al-together because of their preference. To examine these effects we estimate a credit line model specified in equation 2:

$$Credit\ Line_{it} = \sum \lambda_j Z_{jit} + \delta_1 Largest_{it} + \sum \beta_k X_{kit} + e_{it} \qquad (2)$$

where Z_{jit} is a vector of control variables associated with firms that may find internal sources of financing less costly than external sources of financing. These variables include: *CashFlow*, *MTB*, *Size*, and *Tangibility*. *Largest*, is the ownership of the largest shareholder. X_{jit} is a vector of control variables that include the following variables: *Volatility* and *Age*. The choice of variables is discussed in the next section.

At the primary stage of analysis, equation 1 is estimated using OLS. However, the error term e_{it} in equation 1 contains both individual firm-specific effects v_i and the usual idiosyncratic error v_{it}. The individual firm-specific effects v_i are assumed to be correlated with other explanatory variables, which renders the OLS coefficient estimates biased and inconsistent. To get unbiased and consistent estimates of the coefficients, equation 1 is modified to take into account the firm's unobservable specific effects that change across firms but are fixed for a given firm through time (Wooldridge, 2002). This study employs two alternative models that deal with firm heterogeneity: fixed (within) effects and random effects. The fixed effects estimator treats v_i as fixed constants while in random effects estimator v_i are assumed to be

drawn randomly. In this study, we do not make assumptions about the correlation between the independent variables and the unobservable effects and hence we employ both estimation methods. Equation 2 is estimated using probit. To account for the bias resulting from the simultaneous choice of credit lines and cash holdings we estimate equations 1 and 2 using a 3SLS and 2SLS (by applying the CMP procedure suggested by Rodman, 2010). Finally, to account for time and industry variations, the two equations include industry and time effects.

3. Determinants of Liquidity Choices

In this section we review determinates of cash holdings and credit lines as suggested by the relevant literature. Because both models contain similar variables, and for economically similar reasons, we discuss each variable once and explain if this variable will belong to the cash holding or cash equation or both. Our model for cash holdings is based on Opler et al. (1999) and our credit line model is based on Sufi (2009). However, we allow minor addition and deletion of variables based on data availability and relevance to the context of Jordan.

3.1. Cash Flow

We use cash flows as a determinant for the two liquidity choices. Cash flows are expected to be positively related to cash holdings (Opler et al., 1999) because firms prefer internal to external sources of financing in the presence of information asymmetry (Myers and Majluf, 1984, Myers, 1984). The empirical evidence document a positive impact of cash flows on cash (Opler et al., 1999; Ferreira and Vilela, 2004; Ozkan and Ozkan, 2004; and García-Teruel and Martínez-Solano, 2008). Cash flows are also expected to be positively related to the probability of obtaining a credit line (Sufi, 2009). Commercial banks use cash flows as a base to various types of covenants when approving credit lines (Sufi, 2009). For example, firms are usually required to maintain a certain level of cash flows that is at least sufficient to repay the interest expenses. However, Campello et al. (2011) argue that cash cash-flow relationship may be non-linear. At low level of cash firms will seek to have a credit line and hence positive cash flows may help the firm obtain a credit line, but at high level of cash firms may not need to raise funds through credit lines and hence cash flows become unrelated to cash. Campello et al. (2011) find that cash flow is positively related to the ratio of credit lines divided by total liquidity for firms with small cash holdings. In this study we measure cash flows as earnings before interest and taxes and depreciation divided by net total assets (Sufi, 2009). Net total assets are defined as total assets minus cash.

3.2. Growth Opportunities

We also use growth opportunities as a determinant for the two liquidity choices. Firms choose internal financing over information-sensitive external financing in the presence of information asymmetries (Myers and Majluf, 1984). Firms avoid issuing information-sensitive securities because the adverse selection costs make these securities very expensive (Myers and Majluf, 1984). Firms with large growth opportunities are subject to greater information asymmetry which can result in a premium for external financing (Myers and Majluf, 1984). Therefore, a firm with a large set of growth opportunities have incentives to save cash flows into cash in order to avoid a case whereby it will have to pass profitable investment opportunities because of the high costs of external financing. The empirical evidence shows that firms with higher growth opportunities accumulate large amounts of cash (Kim et al., 1998; Opler et al., 1999; Ferreira and Vilela, 2004 Ozkan and Ozkan, 2004; Guney et al., 2007; and García-Teruel and Martínez-Solano, 2008). The flip-side of the argument is that firms with large growth opportunities are less likely to obtain credit lines (Sufi, 2009). Following Sufi (1999) growth opportunities are measured using the net market to book ratio defined as the market value of equity plus book value of net assets minus book value of equity divided by net total assets.

3.3. Firm Size

Size is also used as a determinant for the two liquidity choices. Large firms enjoy economies of scale when they issue external financing as they can distribute the fixed cost component of issuing external funds over a large size of funds (Smith, 1979). In addition, small firms are subject to greater information asymmetry compared to large firms and, therefore are more likely to be financially constrained (Fazzari and Petersen, 1993). Therefore, small firms are expected to accumulate cash and are expected to be less likely to obtain credit lines. The empirical evidence shows that smaller firms accumulate large amounts of cash (Kim et al., 1998; Opler et al., 1999; Ferreira and Vilela, 2004; Bigelli and Sanchez-Vidal, 2012) while other studies document negative but insignificant impact of size on cash holdings (Ozkan and Ozkan, 2004; Guney et al., 2007; and García-Teruel and Martínez-Solano, 2008). Following Sufi (1999), size is measured as the natural logarithm of net total assets, net total assets is defined as total assets minus cash.

3.4. Cash Flow Volatility

Cash flow volatility enters as a control variable in the two liquidity choices. Firms with more volatile cash flows will be subject to a greater number of states in which the firm will be short of liquid assets (Ozkan and Ozkan, 2004). Therefore, firms may fail to finance all profitable projects and they face larger costs of external financing (Ozkan and Ozkan, 2004). Thus, firms with more volatile cash flows are expected to hold more cash in order to reduce the costs of sudden liquidity shortages. The evidence documented in Opler et al. (1999); Bigelli and Sanchez-Vidal (2012); and Guney et al. (2007) show that cash flow volatility is positively related to cash holdings. In an important paper, Bates et al. (2009) find that the volatility of new listed firms accounts for most of the increase in cash holdings witnessed by US firms in the recent decades. In terms of the impact of volatility on the use of credit lines, higher cash flow volatility accelerates the violation of cash flow-based covenants and hence reduces the likelihood of obtaining a credit line (Sufi, 2009). Volatility of cash flows is measured following the approach in Sufi (2009). It is computed as the standard deviation of annual changes in the level of cash flows (earnings before interest, taxes and depreciation) over a lagged four-year period, scaled by average non-cash assets in the lagged period.

3.5. Age

We use the firm's age as a determinant of the two liquidity choices. A firm's age is a proxy of information asymmetry as it measures how much the market knows about the firm. Old firms are expected to be more known to the market in comparison to small firms. We include the natural logarithm of the years since the firm's inception. Age is expected to be negatively related to cash holdings (Opler et al., 1999) and positively related to the likelihood of obtaining a credit line (Sufi, 2009).

3.6. Leverage

We use Leverage as a determinant of cash holdings. Under the financing hierarchy theory, a firm with internal resource surplus uses these resources to repay debt and/or save cash. However, when a firm is in deficit it exhausts its cash savings and/or issue debt. This implies a negative relation between leverage and cash holdings. In addition, Opler et al. (1999) note that firms facing low investment opportunities set have the lowest marginal benefits of holding cash and are also the ones that have high leverage and hence there exist a negative relation between leverage and cash holdings. Several empirical studies document a significant negative relation between leverage and cash holdings including Opler et al. (1999), Guney et

al. (2007) and Ozkan and Ozkan (2004), and García-Teruel and Martínez-Solano, 2008. This study measures leverage as the amount of total debt, short and long, divided by book value of assets.

3.7. Dividends and Capital Expenditures

Following Opler et al. (1999) we include dividends and capital expenditures in our cash model. Dividend cuts can provide funds in case of liquidity shortage (Opler et al., 1999). Dividends cuts are assumed to be associated with low costs and hence dividends-paying firms accumulate lower cash in comparison to non-paying firms. However, Ozkan and Ozkan (2004) argue that dividend-paying firm could accumulate cash to avoid scenarios where they are short of internal cash flows that are insufficient to pay dividends. Dividends are measured by assigning a value of one for firm-years paying dividends and zero otherwise. Capital expenditures could be positively or negatively related to cash holdings. Firms with high growth opportunities invest a lot and hence they hold on average more cash to support their capital expenditures (Opler et al., 1999). However, the financing hierarchy view predicts that firms that spend more on capital expenditures have fewer internal resources and hence these firms would accumulate less cash (Opler et al., 1999).

3.8. Tangibility

We use Tangibility as a determinant of credit lines Sufi (2009). Asset tangibility is expected to be positively related to the likelihood of obtaining a credit line as firms with tangible assets are more likely to have access to credit lines as these assets are easier to value and could be used as collateral (Graham & Harvey, 2001). Tangibility is measured as net fixed assets scaled by non-cash total assets.

Operational definitions of the variables discussed so far are presented in Table 1.

Table 1: Summary of Variable Definitions

Table 1 summarizes variable operational definitions. Financial data is collected from the Corporate Guides issued by the Amman Stock Exchange (ASE). Ownership data is collected from the Corporate Guides for the period 2002-2007 and from the financial statements of listed companies thereafter.

Variable	Proxy
Cash Holding Ratio (*Cash*)	Cash and cash equivalents divided by net total assets. Net total assets equal total assets minus cash.
Credit Line (*Credit Line*)	Indicator variable taking the value of one if the firm has a credit line and zero otherwise.

Duration (*Duration*)	The natural logarithm of the length of time a firm had a credit line in a specific year.
Cash Flow Rights of the Largest Shareholder (*Largest*)	The percentage of shares held by the largest owner who hold 5% or more of outstanding shares.
Cash flows (*Cash Flow*)	Earnings before interest, tax and depreciation divided by net total assets.
Growth opportunities (*MTB*)	Net Market to book value ratio (MTB) defined as the market value of equity plus book value of net assets minus book value of equity divided by net total assets.
Firm size (*Size*)	Natural logarithm of net total assets.
Cash Flow Volatility (*Volatility*)	The standard deviation of annual changes in the level of cash flows (earnings before interest, taxes and depreciation) over a lagged four-year period, scaled by average non-cash assets in the lagged period.
Firm Age (*Age*)	The natural logarithm of the years since the firm's inception.
Debt Ratio (Leverage)	The total of all long and short term borrowings divided by total assets valued at book basis.
Dividends Dummy (*Dividends*)	Dummy variable equals 1 if the firm pays dividends and 0 otherwise.
Capital Expenditures (*Capital Expenditures*)	The change in net fixed assets between two consecutive years divided by total assets at the beginning of the period.
Tangibility (*Tangibility*)	Tangibility is measured as net fixed assets scaled by non-cash total assets.

4. Data Sources and Sample Description

The sample consists of nonfinancial Jordanian companies publicly traded on the Amman Stock Exchange (ASE) over the period 2002-2013. The choice of the sample period is motivated by data availability as the ASE has been reporting financial data regularly through the Company Guides starting from 2002. In addition, the computation of the measure *Volatility* requires observations from the previous four years and therefore the analysis uses the data from the period 2005-2013. The data is collected from three main sources. Data on financial items and information on market values are obtained from the ASE's Company Guides and Trading Files respectively. Company Guides compile financial data items obtained from the financial statements of firms listed in the ASE and is published by the ASE at the end of each year. Trading Files compile market related data including the market value of listed firms. Data on ownership is collected from the Companies Guide for the period 2002-2007. The 2008 Company Guide edition onwards do not compile ownership data. Therefore, ownership data is collected manually from the firm's annual reports for the period 2008-2013. It is mandated that listed firms on the ASE disclose in their annual reports the names of owners with an equity stock holding equal or above 5%, the numbers of declared

shares and the corresponding percentage of ownership for each owner. The financial, market and ownership data are then matched using the firm's identifier. Firms with less than two consecutive years of complete data items are excluded. The final sample consists of 131 nonfinancial firms. The next table presents some descriptive statistics of the key variables in the study.

Table 2: Summary Statistics

Table 2 reports descriptive statistics for a sample of nonfinancial Jordanian firms listed in the ASE over the period 2005-2013. Variables are defined in Table 1.

	Mean	Median	SD	Min	Max	Skewness	Kurtosis
Cash	0.080	0.023	0.153	0	1.241	3.705	19.177
Credit Line	0.619	1	0.486	0	1	-0.491	1.241
Duration	2.330	1	2.588	0	9	0.941	2.784
Largest	32.049	27	19.708	5.523	97.3	1.259	4.605
Cash Flow	0.076	0.071	0.131	-0.534	0.634	0.592	7.206
MTB	1.406	1.129	0.849	0.254	5.633	1.935	7.091
Size	16.810	16.728	1.371	12.649	21.278	0.327	3.555
Volatility	0.085	0.057	0.085	0.002	0.593	2.295	9.534
Age	23.004	18	15.410	1	75	0.968	3.204
Leverage	0.151	0.110	0.154	0	0.680	0.999	3.356
Dividends	0.421	0	0.494	0	1	0.322	1.103
Capital Expenditures	0.118	-0.020	0.862	-0.936	15.796	10.942	156.268
Tangibility	0.409	0.385	0.267	0.000	0.986	0.300	2.113

Table 2 shows that half of firm-year (thereafter firms) observations hold 2.3% of their net total assets as liquid cash. Nonetheless, the mean value of *Cash* is 7.9% indicating that some firms have relatively large cash holdings (relative to the median value). For example, the 75th percentile firms report a *Cash* ratio of 9.3%. It is interesting nonetheless that more than 25% of firm-year observations hold less than 1% of cash. The distribution of cash across the years is fairly homogenous during the 2005-2013 period with the average ranging between 7% low in 2008 and 9.3% high in 2013 (not reported). To examine if there are industry effects, we examine the mean and median values of Cash for the 19 sectors (sectors are defined based on the ASE classification) in Table 3. The mean values indicate that there are some industry effects with regards to cash holdings, however, the median values suggest that the average sector effect may be driven by one or a small number of firms in that sector. For example, the technology and communication sector have the highest average of 41%, however, the high cash ratio in this sector is mainly driven by one company "Jordan Telecom". Nonetheless, we control for both time and industry effects in our regression analysis.

Table 3: Distribution of Cash across Industry Sectors

Table 3 reports the mean and median values of Cash for the 19 sectors in the ASE. Sectors are defined based on the ASE classification.

Sector	Mean	Median
Chemicals	0.058	0.017
Commercial Services	0.135	0.028
Educational Services	0.057	0.009
Electricals	0.074	0.028
Engineering and Construction	0.028	0.007
Food and Beverages	0.036	0.011
Glass and Ceramic	0.011	0.003
Health Care Services	0.059	0.018
Hotels and Tourism	0.109	0.035
Media	0.121	0.040
Mining and Extraction	0.116	0.042
Paper and Cardboard	0.107	0.009
Pharmaceutical and Medical	0.049	0.023
Printing and Packaging	0.035	0.037
Technology and Communications	0.416	0.336
Textiles, Leathers and Clothing	0.064	0.031
Tobacco and Cigarettes	0.088	0.030
Transportation	0.055	0.022
Utilities and Energy	0.018	0.011

Table 4 presents the correlation coefficients between the variables of the study. Focusing on the correlation coefficients between cash and its expected determinants, we note that most variables carry the expected signs. As hypothesized, *Credit Line* and *Duration* are negatively and significantly correlated with *Cash*. In addition, ownership by the largest owner (*Large*), growth opportunities (*MTB*), cash flow (*Cash Flow*) and cash flow volatility (*Volatility*) are all positively and significantly correlated with *Cash*. Similarly, *Leverage* carries the expected negative sign and is significantly correlated with *Cash*. *Dividends* is positively correlated with cash indicating that dividends paying firms maintain a reserve of cash in order to sustain their dividends payments in case of cash flow shortfall. However, other expected determinants of cash including, *Size*, *Capital Expenditures*, and *Age*, are not significantly correlated with *Cash*. With regard to the determinants of having access to credit lines we report that in line with our hypothesis *Size* is positively and significantly correlated with access to *Credit Line* and *MTB* is negatively and significantly correlated with *Credit Line*. However, *Cash Flow* is significantly and negatively correlated with *Credit Line*, while *Tangibility* is negatively correlated with *Credit Line* but at 5% significance level. In the following section we will examine the negative relation between *Cash Flow* and *Credit Line*

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further and show that the relation between these two variables is nonlinear as it depends on the level of cash holdings. We also report that in line with our hypothesis *Large* is negatively and significantly correlated with *Credit Line*.

Table 4: Correlation Matrix

This table shows the correlation between the variables used in the study. Variables are defined in Table 1. *p*-values are in parentheses.

	Cash	Credit Line	Dur	Large	Cash Flow	MTB	Size	Vol	Age	Lev	Div	Cap Exp	Tang
Cash	1												
Credit Line	-0.33	1											
	(0.00)												
Dur	-0.31	0.86	1										
	(0.00)	(0.00)											
Large	0.16	-0.15	-0.13	1									
	(0.00)	(0.00)	(0.00)										
Cash Flow	0.48	-0.14	-0.16	0.10	1								
	(0.00)	(0.00)	(0.00)	(0.00)									
MTB	0.47	-0.24	-0.26	0.13	0.48	1							
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)								
Size	0.03	0.11	0.13	0.02	0.32	0.03	1						
	(0.38)	(0.00)	(0.00)	(0.47)	(0.00)	(0.32)							
Vol	0.16	-0.10	-0.10	0.09	0.02	0.18	-0.08	1					
	(0.00)	(0.00)	(0.00)	(0.01)	(0.49)	(0.00)	(0.01)						
Age	0.05	0.02	0.14	-0.02	-0.02	0.07	0.09	0.00	1				
	(0.12)	(0.46)	(0.00)	(0.49)	(0.57)	(0.03)	(0.01)	(0.95)					
Lev	-0.17	0.04	0.05	-0.05	-0.15	-0.11	0.08	0.06	-0.12	1			
	(0.00)	(0.23)	(0.11)	(0.12)	(0.00)	(0.00)	(0.01)	(0.09)	(0.00)				
Div	0.19	-0.07	-0.06	-0.11	0.50	0.23	0.29	-0.09	0.11	-0.25	1		
	(0.00)	(0.03)	(0.09)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)			
Cap Exp	0.00	-0.01	-0.03	0.04	0.01	-0.01	0.06	0.02	-0.02	0.12	-0.02	1	
	(0.91)	(0.78)	(0.38)	(0.19)	(0.74)	(0.84)	(0.09)	(0.64)	(0.65)	(0.00)	(0.65)		
Tang	0.06	-0.07	-0.09	0.16	0.09	0.07	-0.02	-0.09	-0.17	-0.05	-0.04	0.02	1
	(0.08)	(0.03)	(0.00)	(0.00)	(0.00)	(0.02)	(0.58)	(0.01)	(0.00)	(0.14)	(0.22)	(0.62)	

5. Results and Analysis

5.1. Cash Holdings and Access to Credit Lines

We start the analysis by examining the impact of credit lines and the duration of credit lines on the level of cash holdings. Credit lines are important alternative of cash holdings given that they provide liquidity insurance and hence they could substitute cash. However, we are more interested in credit lines as a proxy of the presence of an existing relationship with an outside source of financing and the impact of the strength of this relationship on cash holdings. We are also interested in examining the impact of having credit lines on mitigating financial constraints. Provided that saving cash out of cash flows is a good indicator of the financial constraints facing a firm, firms with credit lines will have fewer incentives to save cash out of cash flows in comparison to firms without credit lines. In order to examine the impact of credit lines on cash holdings we estimate the cash model specified in equation 1 using OLS, fixed and random effects and report the results in Table 5. All specifications include time effects to control for macroeconomic conditions and industry effects, except for the fixed effects estimator, to control for industry variation on cash holdings. The model is estimated using robust standard errors.

We start our analysis by discussing the impact of the set of control variables. *Cash Flow* is positively and significantly related to *Cash* at the 1% level in all specifications. This result is consistent with the pecking order views of cash holdings, where firms accumulate internal sources of financing to avoid the premium of external sources of financing in the presence of information asymmetry. In addition, we find that find that *MTB* carries the predicted positive sign and is statistically significant at the 1% level (5% using the fixed effects estimator). Firms with large *MTB* maintain larger cash balances in order to avoid a case whereby they will have to pass profitable investment opportunities because of the high costs of external financing. *Size* is negatively related to *Cash*, however, the impact is statistically significant at the 5% and 10% level for the OLS and random effects respectively but is statistically insignificant for the fixed effects model. This result is consistent with the view that large firms enjoy larger economies of scale and are subject to lower information asymmetry and hence have fewer incentives to accumulate cash. *Volatility* is positively related to *Cash* with a significant impact is at the 1% and 5% level for the OLS and random effects respectively but is a statistically insignificant for the fixed effects model. Firms with more volatile cash flows will be subject to a greater number of states in which they will be short of liquid assets and

therefore they may fail to finance all profitable projects which incentivize them to accumulate more cash. *Leverage* is negatively related to *Cash* but significant only using the OLS estimator. Firms with leverage are also characterized by low growth opportunities and hence they accumulate low cash. *Dividends*, *Capital Expenditures*, and *Age* are all insignificant in all models except for *Age* in OLS estimation.

Table 5: Estimation Results of the Cash Model with Credit Line

Table 5 reports estimation results of the cash model with *Credit Line* as the main variable of interest using three estimation methods. The sample consists of nonfinancial Jordanian firms listed in the ASE over the period 2002-2013. Estimation is carried over the period 2005-2013 due to loss of data caused by the computation of *Volatility*. Variables are defined in Table 1. *t*-statistics (alternatively *z*-statistics) are in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% respectively.

	OLS	Fixed Effects	Random Effects
Constant	0.135 (1.71)*	-	-
Credit line	-0.049 (-6.85)***	-0.017 (-2.16)**	-0.027 (-3.63) ***
Leverage	-0.144 (-4.71) ***	-0.001 (-0.03)	-0.037 (-1.08)
Cash Flow	0.434 (5.55) ***	0.290 (4.53) ***	0.312 (4.90) ***
MTB	0.041 (4.90) ***	0.025 (2.25)**	0.030 (2.93) ***
Size	-0.011 (-2.13)**	-0.037 (-1.36)	-0.021 (-1.80)*
Volatility	0.191 (2.91) ***	0.098 (1.37)	0.124 (2.09)**
Dividends	-0.014 (-1.47)	0.004 (0.56)	0.002 (0.28)
Capital Expenditures	0.001 (1.12)	0.000 (0.57)	0.000 (0.95)
Age	0.014 (1.87)*	0.006 (0.18)	0.022 (1.62)
Time Effects	Yes	Yes	Yes
Industry Effects	Yes	-	Yes
Observations	932	932	932
Groups	131	131	131
R^2	0.4672	0.1677	0.1636
F Test (P Value)	-	10.89 (0.000)	-
Hausman Test (P Value)	-	-	35.94 (0.005)

The variable of interest *Credit Line* is negatively and significantly related to cash holdings at the 1% significance level except for the fixed effects model where it is significant at the 5%. Taking the random model as our base case, we expect firms with credit lines *citrus paribus* to have on average lower cash holdings by 2.7%. This is a large difference given that the average cash holding is 8%. This result could be attributed to a substitution effect between credit lines and cash holdings. Firms that secure a credit line facility can use the facility as an alternative to cash holdings for liquidity purposes. Next, we measure the duration of the credit line by counting the number of periods the firm have had a credit line. The available data does not specify the source of the credit line and therefore we assume that the credit line is provided by the same bank. This assumption works against finding a negative relationship

between the duration of the credit line and cash holdings, and hence will weaken the statistical significance. We examine the impact of *Duration* on *Cash* using the full sample and the sub-sample of firms with credit lines. This is because *Duration* could be a noisy proxy of *Credit Line* and hence measures the substitution effect in the full sample rather than the relationship effect. Table 6 reports the results of the impact of Duration on Cash using the full sample in the first column and the sample of firms with credit lines in the second column. We find that *Duration* has a negative and significant effect on cash holdings at the 1% and 10% levels respectively. We attribute the reduction in the significance level among firms with credit lines to the noise caused by the measurement errors of *Duration*.

Table 6: Estimation Results of the Cash Model with Duration

Table 6 reports estimation results of the cash model using *Duration* for the full sample and the sub-sample of firms with credit lines using random effects. The sample consists of nonfinancial Jordanian firms listed in the ASE over the period 2002-2013. Estimation is carried over the period 2005-2013 due to loss of data caused by the computation of *Volatility*. Variables are defined in Table 1. *z*-statistics are in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% respectively.

	Full Sample	Firms with Credit Lines
Duration	-0.022 (-3.85)***	-0.018 (-1.66)*
Leverage	-0.036 (-1.04)	0.032 (0.74)
Cash Flow	0.313 (4.90)***	0.194 (2.31)**
MTB	0.030 (2.95)***	0.021 (1.85)*
Size	-0.021 (-1.81)*	0.003 (0.61)
Volatility	0.129 (2.21)**	0.120 (2.16)**
Dividends	0.002 (0.32)	0.001 (0.10)
Capital Expenditures	0.000 (0.87)	0.000 (-0.03)
Age	0.024 (1.79)*	0.010 (1.32)
Time Effects	Yes	Yes
Industry Effects	Yes	Yes
Observations	932	577
R^2	0.1675	0.1246

The previous analysis shows that firms with credit lines and longer credit line accumulate lower cash holdings due to a substitution and relationship effects. These results imply that firms with credit lines, especially the ones with longer durations, are less constrained in the sense that they secure funds externally when needed presumably at a fair cost. Therefore, it is important to identify which firms choose access or lack of it to credit line facilities and why.

5.2. Credit Lines and External Costs of Financing

We use a credit line model following Sufi (2009) focusing on two groups of variables. Similar to Sufi (2009), the first group of interest include firm characteristics that are likely associated with firms facing high costs of external financing, namely: cash flows, tangibility, size and book to market. The second group elates to ownership of largest shareholders which we will discuss next section. We are interested in the first group because firms facing higher costs of external financing are "forced" out of credit line services offered by banks (Sufi, 2009). In other words, these firms are likely to be difficult to value, even for banks, and hence they are offered credit lines at terms that reflect in part information asymmetries and other market imperfections. We expect small, intangible firms with low cash flow and high market to book ratio to rely on internal cash rather than credit lines. To test or prediction, we estimate equation 2 using Probit and report the results in Table 7. We find that smaller firms and firms with higher MTB are less likely to have access to credit lines. This evidence is consistent with the view that firms facing higher costs of external financing are "forced" out of credit line services offered by banks. However, Cash Flow is negatively and significantly related to the probability of having a credit line which is inconsistent with our prediction. This finding implies that firms with low cash flows are more likely to secure a credit line.

To examine this finding in more details, we follow Campello et al. (2011) who argue that the relation between cash flow and credit lines is nonlinear and that it depends on the amount of cash a firm has in hand. At low level of cash firms will seek to have a credit line and hence positive cash flows may help the firm obtain a credit line. However, at high level of cash firms may not need to raise funds through credit lines and hence cash flows become unrelated to cash. To test their prediction Campello et al. (2011) use an interaction variable between cash flow and cash holdings in a model that explains the variation in the size of the credit facility to total assets. However, our measure of credit lines is an indicator variable that takes a value of one if a firm have a credit line and zero otherwise. A zero observation, therefore, is a firm who depends solely on cash and therefore we do not include another cash measure in the right hand side. In order to test the non-linearity of the impact of cash flows on the probability of having access to credit lines, we stratify our sample based on their cash holdings into high and low cash holding firms and report the estimates in Columns 2 and 3 respectively in Table 7. Consistent with our conjecture we find that cash flow exerts a positive and significant impact on the probability of obtaining a credit line among firms with small cash holdings, but has no impact among firms with large cash holdings.

Table 7: Estimation Results of the Credit Line

Table 7 reports estimation results of the credit line model using probit. The sample consists of nonfinancial Jordanian firms listed in the ASE over the period 2002-2013. Estimation is carried over the period 2005-2013 due to loss of data caused by the computation of *Volatility*. Variables are defined in Table 1. *z*-statistics are in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% respectively.

	Credit Line	Small Cash Holding Firms	Large Cash Holding Firms
Cash Flow	-1.473 (-3.29)***	3.381 (2.63)***	-1.130 (-0.81)
MTB	-0.306 (-4.73)***	-0.105 (-0.51)	-0.502 (-3.19)***
Size	0.214 (5.15)***	0.017 (0.12)	0.456 (3.65)***
Tangibility	-0.094 (-0.47)	0.022 (0.04)	0.318 (0.61)
Age	-0.069 (-0.93)	-0.100 (-0.46)	-0.437 (-2.35)**
Volatility	-1.258 (-2.18)**	-4.434 (-3.05)***	-0.535 (-0.45)
Time Effects	Yes	Yes	Yes
Industry Effects	Yes	Yes	Yes
Observations	932	209	213
R^2	0.133	0.172	0.320

Can we interpret the previous evidence documented in Tables 5-7 from the view that firms without credit lines are financially constrained? In order to examine this question, we follow Almeida et al. (2004) approach where they examine the sensitivity of cash to cash flows of firms sub-grouped based on a priori of financial constraints. The common used priori in the literature are: payout ratio, firm size, bond ratings, commercial paper market ratings, and financial constraints indexes (Fazzari and Hubard, 1988, Almeida et al., 2004, Acharya et al., 2007). Firms identified by the priori as firms facing financial constraints (firms with low payout ratio, small firms, without bond or commercial paper ratings) are expected to save more cash from their cash flows to meet their financing needs. In this paper we examine the propensity of saving cash from cash flows for firms with and without credit lines. We run tests similar to Almeida et al. (2004) for firms with and without credit lines using their model and our extended model. We find that firms without a credit line indeed have a higher sensitivity of cash to cash flows with a significant positive coefficient of 0.133 compared to firms without credit ratings with an insignificant coefficient of 0.034.

Table 8: Estimation Results of the Cash Flow Sensitivity of Cash

Table 8 reports estimation results of the cash flow sensitivity of cash using a reduced and extended model. The dependent variable is the change in cash holdings. The extended model contains the set of variables identified in equation 1. The sample consists of nonfinancial Jordanian firms listed in the ASE over the period 2002-2013. Estimation is carried over the period 2005-2013 due to loss of data caused by the computation of *Volatility*. Variables are defined in Table 1. *z*-statistics are in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% respectively.

	Cash Flow	MTB	Size	R^2
Reduced Model				
Constrained (without CL)	0.133**	-0.010	0.001	0.044
	(2.08)	(-1.22)	(0.19)	
Unconstrained (with CL)	0.034	0.008	-0.002	0.019
	(0.93)	(1.60)	(-0.70)	
Extended Model				
Constrained (without CL)	0.11*	-0.011	0.002	0.063
	(1.78)	(-1.14)	(0.53)	
Unconstrained (with CL)	0.044	0.009**	-0.002	0.023
	(1.19)	(2.00)	(-1.11)	

5.3. Liquidity Choices and Ownership

The evidence so far has viewed credit lines from the precautionary motive perspective. Firms facing lower costs of external financing are more likely to obtain credit lines, they exhibit less sensitivity of cash to cash flows and they accumulate less cash especially when the duration of credit lines increases. However, credit lines are debt instruments and hence they can be affected by the preferences of owners-controllers towards leverage. Strebulaev and Yang (2013) study zero-leverage behaviour among US firms and show that a firm's ownership structure affects the probability of having zero leverage. In this study we examine the impact of the ownership of the largest owner on the probability of having a credit line. The results are reported in Table 8. We find that the ownership of the largest owner is negatively and significantly related the probability of having a credit line. To examine if this finding is driven by the demand rather than the supply side, we examine the impact of ownership on the size of the used credit line (as a proportion to total assets) and report the results in Table 9, the second column. We find that ownership is also negatively related to the used proportion of the credit line, suggesting that even in the case where firms with large owner-controller obtain credit lines they are reluctant to use it. In addition, we examine if ownership is negatively related to leverage and report the results in the third and fourth columns in Table 9. We find that *Large* is negatively but insignificantly related to *Leverage* in the whole sample and negatively and significantly related to *Leverage* in the sample of firms without

credit lines. These results suggest that firms with large owner-controller are less likely to obtain credit lines and obtain little debt in comparison to other firms when they lack access to credit lines.

Table 9: Estimation Results of the Cash Model

Table 9 reports estimation results of the credit line model with *Largest* as the main variable of interest. Table 9 also reports the estimation results of the impact of *Largest* on *Used Credit Line* and *Leverage*. The sample consists of nonfinancial Jordanian firms listed in the ASE over the period 2002-2013. Estimation is carried over the period 2005-2013 due to loss of data caused by the computation of *Volatility*. Variables are defined in Table 1. *t*-statistics (alternatively *z*-statistics) are in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% respectively.

	Credit Line	Used Credit Line	Leverage Full Sample	Leverage Credit Line Sample
Largest	-0.626 (-2.37)**	-0.054 (-1.70)*	-0.023 (-0.60)	-0.104 (-2.94)***
Cash Flow	-1.456 (-3.26)***	-0.044 (-1.01)	-0.123 (-2.66)***	-0.179 (-3.07)***
MTB	-0.289 (-4.43)***	-0.002 (-0.37)	-0.002 (-0.37)	0.007 (0.96)
Size	0.220 (5.29)***	0.037 (2.26)**	0.041 (2.23)**	0.108 (4.70)***
Tangibility	0.027 (0.13)	0.006 (0.30)	0.025 (0.60)	0.044 (0.96)
Volatility	-1.041 (-1.76)*	0.011 (0.26)	-0.007 (-0.11)	-0.180 (-2.02)**
Age	-0.066 (-0.89)	-0.003 (-0.13)	0.013 (0.51)	-0.028 (-0.83)
Time Effects	Yes	Yes	Yes	Yes
Industry Effects	Yes	-	-	-
Observations	932	932	932	355
R^2	0.138	0.051	0.053	0.238

To evaluate the economic importance of these effects we compute the marginal effects for the factors influencing the probability of obtaining a credit line model when the factor increase from its median value to the 75th percentile holding all other variables at their mean levels. We find that *Size*, *MTB*, *Largest*, and *Volatility* have the largest impacts on the probability of having a credit line. An increase of *Size* from the median to the 75th percentile increases the probability of obtaining a credit line by 6.9%, an increase of *MTB* decreases the probability of obtaining a credit line by 4.9%, an increase in *Largest* decreases the probability of obtaining a credit line by 3.5%, and increase of *Volatility* decreases the probability of obtaining a credit line by 2%. *Tangibility* and *Age* have minor marginal effects of 0.23% and (negative) 1.3% respectively. As for *Cash Flow* we report the marginal effect of (negative) 3.1% for completeness purposes but advise that the effect of *Cash Flow* on *Credit Line* is non-linear.

We documented so far that *Largest* has a significant negative impact on the probability of obtaining a credit line, but we didn't examine if *Largest* has an impact over cash holdings. Firms with large owners choose to avoid credit lines and may compensate loss of liquidity provided by accumulating more cash. However, we are interested in excess cash holdings and hence we are concerned with examining the impact of ownership of the largest owner on the joint determination of the liquidity choices. To estimate the impact of ownership on cash holdings on the joint determination of cash holdings and credit lines, we estimate a two stage least squares (2SLS) using the CMP procedure suggested by Rodman (2010). CMP is useful in estimating simultaneous equations with a binary dependent variable in the second stage. We also estimate the system using three stage least squares (3SLS) system of equations. The results are reported in Table 10. We find that ownership is significantly and negatively related to credit lines but significantly and positively related to cash holdings. This result suggests that firms with large controlling shareholder pursue a liquidity policy of low credit lines and excess cash holdings.

Table 10: Simultaneous Equations

Table 10 reports estimation results of the simultaneous equation system of cash holdings and credit line models using 2SLS (by applying the CMP procedure suggested by Rodman, 2010) and 3SLS respectively. *Largest* as the main variable of interest. The sample consists of nonfinancial Jordanian firms listed in the ASE over the period 2002-2013. Estimation is carried over the period 2005-2013 due to loss of data caused by the computation of *Volatility*. Variables are defined in Table 1. *z*-statistics are in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% respectively.

	2SLS	3SLS
Cash Model:		
Largest	0.056 (2.08)**	0.056 (2.64)***
Cash Flow	0.458 (5.70)***	0.456 (10.87)***
MTB	0.050 (6.19)***	0.050 (8.73)***
Size	-0.010 (-2.17)**	-0.010 (-2.95)***
Volatility	0.167 (2.87)***	0.168 (3.39)***
Age	0.008 (1.29)	0.008 (1.28)
Leverage	-0.114 (-4.36)***	-0.118 (-3.20)***
Dividends	-0.021 (-2.20)**	-0.020 (-2.02)**
Capital Expenditures	0.001 (0.97)	0.001 (1.83)*
Credit Line Model:		
Largest	-0.914 (-3.51)***	-0.275 (-3.51)***
Cash Flow	-1.798 (-3.47)***	-0.344 (-2.43)**
MTB	-0.325 (-4.88)***	-0.115 (-5.38)***
Size	0.237 (5.31)***	0.055 (4.62)***
Tangibility	0.123 (0.65)	-0.052 (-0.91)
Volatility	-0.911 (-1.51)	-0.190 (-1.04)
Age	-0.037 (-0.52)	0.021 (0.94)
Time Effects	Yes	Yes
Industry Effects	Yes	Yes
Observations	932	932

6. Conclusion and Summary of the Results

This paper investigates the determinants of two liquidity choices of nonfinancial firms listed on the ASE over the period 2005-2013 by studying the cash holding and credit line choices. This article focuses mainly on the impact of bank access, measured by having a credit line, and the strength of this access, measured by the length of time a firm has a credit line, on a firm's cash holdings. In addition, the study examines the impact of a firm's properties that are associated with high costs of external financing on the probability of having a credit line. We find that firms with credit lines and longer durations of credit lines accumulate significantly lower cash holdings. We also find that firms subject to larger external financing (small and with higher growth opportunities) are less likely to obtain credit lines. Taken together, these

findings imply that firms without credit lines are financially constrained. To investigate this finding further we show that firms with credit line exhibit no sensitivity of cash flow to cash whilst firms without credit lines exhibit a positive and significant sensitivity of cash flow to cash. To examine if there are any demand side influences on liquidity policies, we examine the impact of the ownership of the largest owner on the probability of obtaining a credit line and on the joint determination of credit lines and cash policies. We document a negative significant impact of the ownership of the largest owner on the probability of obtaining a credit line. We also document a significant positive impact of ownership on the level of cash holdings. These results suggest that firms with large owner-controller follow a policy of no credit lines and high cash balances.

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