Article

Credit Constraints and Investment-Cash Flow Sensitivity in Declining Economic Conditions: The Role of Reliance on Bank Debt

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Abstract: This paper examines the sensitivity of investment to cash flow in declining economic conditions, focusing on the impact of a firm's reliance on bank debt. Using the context of Jordan, a developing Middle East and North Africa (MENA) country, the study utilizes the standard Q theory of investment augmented by cash flow, leverage, and liquidity. Then, it allows for differential loading on the cash flow coefficient pre- and post-2008, the year that marks the beginning of declining conditions, and by categorizing companies based on their reliance on bank debt, measured by having access to a bank line of credit. Using alternative estimation specifications, the findings indicate that firms' investments decreased significantly in episodes of declining conditions. In addition, the findings indicate that firms' investments exhibited more sensitivity to cash flow during declining conditions, especially for firms with access to lines of credit. The latter finding suggests that firms reliant on bank debt could not compensate for the credit shortages by switching to other sources of external funding and therefore they were compelled to use more of their internally generated funds to finance their investments.

Keywords: investment-cash flow sensitivity; credit constraints; lines of credit; economic policy uncertainty; developing markets; MENA

1. Introduction

The role of financial sector development in improving the efficiency of investment allocation has been the subject of important research (Aghion et al. 2018; Allen et al. 2018; Tirole 2010). Indeed, the empirical evidence documents a positive impact of financial development on economic growth and gross capital formation (Beck et al. 2014; Cama and Emara 2022; Hunjra et al. 2022; Nguyen 2022; Popov 2018). In addition, firm-level based evidence shows that firms facing credit constraints, i.e., when external finance provided by the financial sector is costly or unavailable, are forced to rely on their internal sources of finance, causing a larger degree of sensitivity of investment to cash flow (Ağca and Mozumdar 2017; Chiu et al. 2022; Ek and Wu 2018; Fazzari et al. 1988, 2000; Lewellen and Lewellen 2016; Tayem 2015b). The present article builds on this literature by examining the impact of declining economic conditions on the sensitivity of investment to cash flow using the context of Jordan, a developing market from the Middle East and North Africa (MENA) region, with a focus on the role of a firm's reliance on bank debt on attenuating (or exacerbating) the impact of these conditions on investment-cash flow sensitivity.

The literature on investment-cash flow sensitivity focuses mainly on firm-specific factors that influence the investment-cash flow relationship (Ağca and Mozumdar 2017; Chiu et al. 2022; Ek and Wu 2018; Fazzari et al. 1988; Lewellen and Lewellen 2016; Tayem 2015b), with little research on the impact of macro conditions on this relationship. Although there is important literature on the relationship between macro conditions and firms' investments, the focus of this literature is on the impact of those conditions on firm investment behaviour, not on investment-cash flow sensitivity. For example, several studies examine the impact of weaknesses caused by the 2008 crisis on corporate investment (Bucă and

Vermeulen 2017; Campello et al. 2010, 2011). Other studies examine the impact of economic conditions on corporate investments, with a focus on conditions of financial nature such as monetary policy, interest and exchange rates, credit demand and financial development (Masuda 2015; Tang et al. 2022). In addition, there is emerging research that examines firm-level investment behaviour over the business cycle (Jeon and Nishihara 2014; Schoder 2013) and the impact of economic uncertainty on firm investment (Azimli 2022; Chen et al. 2020; Gulen and Ion 2016; Wang et al. 2014). The premise of this research is that economic uncertainty discourages corporate investments because of the presence of adjustment costs or the irreversibility of investment costs (Gulen and Ion 2016; Wang et al. 2014).

The focus of the above-mentioned strand of literature is on the impact of economic shocks and uncertainty on firms' investment behaviour, not on the investment-cash flow relationship. Although some studies do examine the impact of macro shocks on investment-cash flow sensitivity, most of these studies focus on the impact of shocks of financial nature not on shocks that originate in the real sector. For example, Zubair et al. (2020) examine the impact of the financial crisis, Gül and Taştan (2020) and Guizani and Ajmi (2020) examine the impact of monetary policy and financial development, while Gupta et al. (2022) examine the impact of economic policy uncertainty. Furthermore, studies on economic conditions and firm investment behaviour focus on cases of developed and transition economies, with little research on small and developing economies. However, the study of firms' investment behaviour in small developing economies is important because of the pivotal role played by private investments in driving economic growth and employment (Beck et al. 2014). In addition, there is little research on firms' investments in the MENA region, with some exceptions such as Guizani and Ajmi (2020), which examine the case of Saudi Arabia. MENA represents an integral part of the world economy, and Jordan, with its characteristics shared with other MENA countries, is a useful study of the region.

Therefore, this study addresses this gap in the literature by examining the impact of declining economic conditions on firms' investment-cash flow sensitivity using the context of Jordan. Specifically, this study attempts to answer the following questions: Do declining economic conditions have a negative impact on firms' investments and growth? Do declining economic conditions strengthen the reliance of firms on their internal sources of finance and the degree of investment to cash flow sensitivity? How do these conditions affect the investment-cash flow sensitivity of firms reliant on bank debt? To answer these questions, the study utilizes the standard Q theory of investment (Hayashi 1982; Tobin 1969), augmented with cash flow to capture investment sensitivity to the availability of internal finance (Ağca and Mozumdar 2017; Chiu et al. 2022; Ek and Wu 2018; Fazzari et al. 1988; Lewellen and Lewellen 2016; Tayem 2015b). This study follows the literature by subdividing listed Jordanian firms into two clusters based on their access to lines of credit, a measure of a firm's reliance on bank debt. The choice of lines of credit as a clustering criterion is motivated by the fact that Jordan is a bank-based economy where banks are the main providers of external finance (Tayem 2022) and that the issuance of stocks and bonds on the stock exchange is rare (Tayeh et al. 2015; Tayem 2017). Further, line-of-credit facilities are the main lending vehicle employed by the banking sector (Tayem 2022). These facilities have the advantage of providing liquidity when firms face uncertainty about new investment opportunities (Sufi 2009). The study, then, examines the sensitivity of investment to cash flow for the two firm clusters during the full sample period and in the pre- and post-2008 periods, with the year 2008 marking the start of declining conditions in Jordan.

This study chooses the context of Jordan because of the growing evidence indicating that investment-cash flow sensitivity is diminishing in developed countries, but is still present in emerging and developing markets (Brown and Petersen 2009; Larkin et al. 2018; Machokoto et al. 2021; Moshirian et al. 2017; Verona 2020). In addition, Jordan is a small, developing economy, indicating that firms tend to face higher uncertainty in investment decisions (Bloom 2017) and greater credit constraints (Tayem 2017) than those in large, developed economies. Also, external financing of corporate Jordan is dominated by bank

debt, with lines of credit being the main lending vehicle (Tayem 2022). Furthermore, the context of the Jordanian market offers an appropriate setting to examine the hypotheses of this study. This is because the real sector in Jordan showed signs of decline post-2008, while the banking sector, which is the main supplier of external finance, showed strong performance and stability measures pre- and post-2008, hence the weaknesses of the real sector in Jordan did not translate into weaknesses in the financial sector (see Section 2). Nonetheless, Jordanian banks have shifted their loan portfolio structures away from business lending, which has led to tightening the supply of bank credit and an increase in the cost of funds to businesses. Hence, this study identifies a new channel for tightening bank credit, i.e., changes in the structure of bank loan portfolio, and examines how firms, especially the ones reliant on bank debt, responded to shortages of credit supply.

The findings of this study contribute to the literature in several ways. First, this study contributes to the literature on the impact of economic conditions and uncertainty on investment behaviour, as it supports the evidence that worsening economic conditions affect firm investment negatively (Schoder 2013; Jeon and Nishihara 2014; Wang et al. 2014; Gulen and Ion 2016; Chen et al. 2020; Azimli 2022), using a new context that has not been examined before which can be viewed as out-of-sample evidence to test whether this outcome only pertains to developed and transition economies. In addition, this study contributes to the literature on investment-cash flow sensitivity in documenting that firms in Jordan, a developing market, still exhibit investment-cash flow sensitivity, unlike firms in many developed markets (Brown and Petersen 2009; Larkin et al. 2018; Machokoto et al. 2021; Moshirian et al. 2017). This finding is important in shaping our understanding of the role of financial development in easing firms' financial constraints. Furthermore, this study contributes to the literature on the adverse impact of worsening financial conditions on the imposition of further financial constraints on businesses (Campello et al. 2010; Zubair et al. 2020). Unlike previous literature, this study examines the case of a small developing country with a bank-based economy. In addition, this study examines a context under which banks have healthy balance sheets, nonetheless, bank credit was tightened because of changes in bank loan portfolio choices. Consequently, firms were compelled to use more of their internally-generated resources to finance their investments, especially firms reliant on bank debt, because they were not able to compensate for the credit shortages by switching to other sources of external funding. Furthermore, this study contributes to the growing number of articles that examine the investment behaviour of firms operating in developing economies, especially in MENA countries (Guizani and Ajmi 2020).

The remainder of this article is organized as follows. The next section presents an overview of the Jordanian economy with a focus on the past decade. Section 3 discusses the methodology and research design while Section 4 presents the data, sample, and descriptive statistics. Section 5 presents the results and Section 6 discusses the findings. Section 7 concludes the paper.

2. Jordanian Economy: A Background

The Jordanian economy has exhibited declining economic conditions during the past decade. The start of the declining conditions coincided with the financial crisis of 2008; however, Jordan suffered an extended aftermath of the financial crisis, followed by multiple crises detailed below. During this study's sample period of 2002–2019, Jordan's economy was stagnant from 2008 to 2019. Figure 1 shows a sharp decline in GDP growth between 2008 and 2009 and a prolonged period of slow economic growth thereafter. Several reasons contributed to the declining economic conditions post-2008 including (i) the global recession caused by the crisis of 2007/2008, (ii) the Arab Spring, as Jordan received a large number of refugees during that period and lost a significant share of trade with Syria, (iii) the weaknesses of the Jordanian energy sector, and (iv) the nationalization movements in the Gulf countries which led to the termination of existing contracts of a large number of Jordanian workers in those countries and fewer new job opportunities abroad. The above-mentioned factors, alongside the contractionary fiscal and monetary policies run by

consecutive Jordanian governments during that period, exposed the structural weaknesses of private investments.
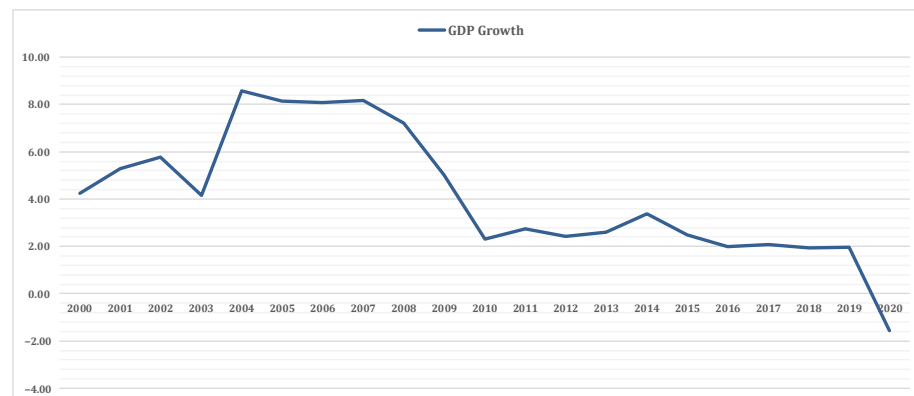

Figure 1. GDP growth over the period 2000–2020. Source: World Bank Development Indicators.

The declining economic conditions over the past decade are reflected in the stock exchange's performance in terms of the number of listed firms and the valuation of listed firms to book values and GDP. The number of companies listed on the Amman Stock Exchange (ASE) has decreased over time from 245 in 2007 to 179 in 2020 (ASE's Key Statistics, various issues) and the size of the market has been shrinking; as of 2020, the size of the market was less than 41% of GDP, down from about 240% of GDP in 2007 (World Bank Development Indicators). In addition, corporations are unable to grow or even survive with a continuous pattern of de-investing that has been going on for at least the past decade. The declining conditions of the ASE are especially troubling given the significant investment in reforms and plans aimed at strengthening the private sector and the Jordanian stock market put forward in the 2000s (Tayem 2015a).

However, the banking sector in Jordan, which is the main provider of external funds, has shown few signs of instability, and has been steadily performing well during the past decade. For example, bank assets grew by more than 4% throughout the declining conditions, with a book value of assets equal to 63 billion in 2020 compared to 40 billion in 2007 (See Figure 2). In addition, bank performance in terms of accounting numbers registered remarkably stable interest margins, with an average of 2.8% (ASE Companies Guide, various issues). Therefore, one could argue that banks' ability to supply credit has not been adversely affected by the economic conditions post the 2008 period. However, it is important to note that during the same period, bank asset structure shifted towards more investment in government securities, with an average investment of 1.7 billion before 2008 and 9.5 billion post-2008 (See Figure 2). Furthermore, credit to the industrial sector as a proportion of bank loan portfolio has been declining from a reported 18.5% in 2008 to only 13.1% in 2020 (Central Bank Annual Report, various issues). Additionally, the cost of bank finance has been increasing steadily, as illustrated in Figure 3.
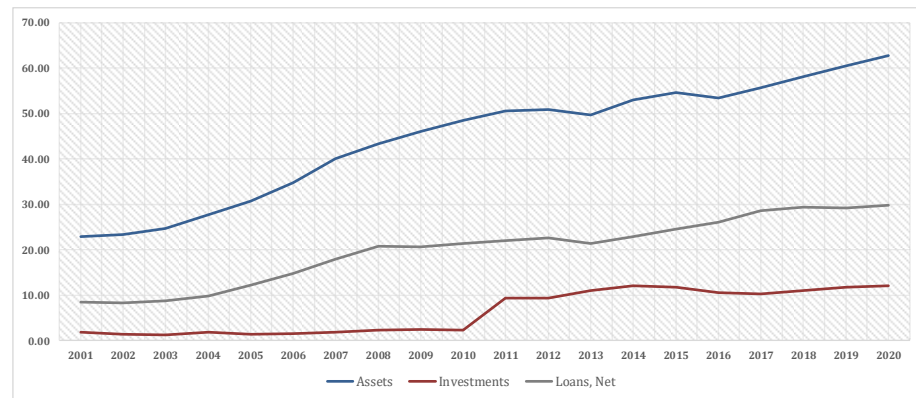
Figure 2. Listed banks' assets, government bond investment and loans over the period 2001–2020. Source: ASE's Companies Guide (various issues).
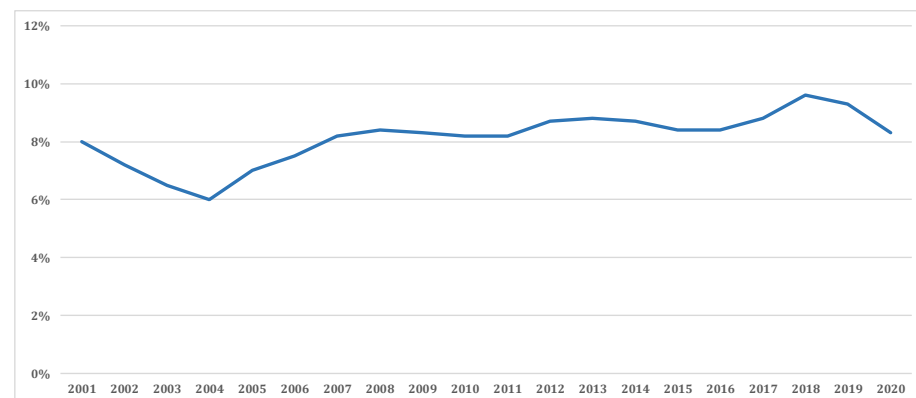

Figure 3. Prime rate over the period 2001–2020. Source: Central Bank Statistics Database.

3. Methodology and Research Design

3.1. Hypotheses Motivation

A growing literature examines the impact of uncertainty related to economic, political and policy shocks on firm-level investment decisions with the assumption that uncertainty has a negative impact on firm-level investment (Azimli 2022; Chen et al. 2020; Gulen and Ion 2016; Wang et al. 2014). The rationale behind this assumption originates from the real-option theory, which shows that because capital investments are costly and irreversible, the higher the degree of uncertainty the larger the value of the option of waiting for uncertainty to resolve (Gulen and Ion 2016; Wang et al. 2014) and therefore firms reduce their current investment spending as uncertainty increases. Several studies show that firm investment and disinvestment decisions depend on the state of the economy (Jeon and Nishihara 2014; Schoder 2013), while other studies focus on economic policy uncertainty and show that it has a significant negative impact on corporate investment in the US (Gulen and Ion 2016), China (Wang et al. 2014), Japan (Morikawa 2016) and Australia (Chen et al. 2020). Therefore, this study predicts that in episodes of declining economic conditions firm investments will decrease as stated in H1:

H1. *Corporate investments decrease significantly in episodes of declining economic conditions.*

However, the impact of economic conditions on investment-cash flow sensitivity is less clear. On one hand, if the financial sector is affected negatively by the declining economic conditions, we would expect external financing to become less available and investment-cash flow sensitivity to become larger (Guizani and Ajmi 2020; Verona 2020). For example, research on the financial crisis of 2008 shows that firms became more constrained during the crisis and relied more on their internal resources of funds (Bucă and Vermeulen 2017; Campello et al. 2010; Zubair et al. 2020). However, if the financial sector is not affected by

these conditions and the supply of funds is made available to businesses, the investment-cash flow sensitivity will not differ significantly across economic conditions. Nonetheless, the weaknesses in the real sector can affect the motives of the financial sector, as in the case of Jordanian banks, to supply credit to businesses and induce banks to shift their loan portfolios to more profitable segments. This can result in a decrease in the supply of funds to businesses and strengthen the reliance of businesses on internal sources of funds which in turn can strengthen investment-cash flow sensitivity. The second hypothesis of this study is stated as follows:

H2. *Investment-cash flow sensitivity increases significantly in episodes of declining economic conditions.*

The third hypothesis focuses on the impact of a firm's reliance on bank debt on the firm's investment, and employs lines of credit as a clustering criterion. Early evidence by Fazzari et al. (1988) finds significantly higher sensitivity of investment to internally generated funds in constrained compared to unconstrained firms. Supporting evidence from the US includes Lewellen and Lewellen (2016), Ağca and Mozumdar (2017) and Ek and Wu (2018). In addition, evidence from other markets, such as Gupta et al. (2022) from India, Guizani and Ajmi (2020) from Saudi Arabia and Tayem (2015b) from Jordan, finds that constrained firms display the highest investment-cash flow sensitivity. However, it is important to note that the premise of investment-cash flow sensitivity is challenged by several authors, most notably Kaplan and Zingales (1997). Sufi (2009) shows that firms with lines of credit are financially less constrained than the ones without lines of credit. Firms with line-of-credit facilities rely on bank debt to provide financial flexibility to meet their unexpected financial needs (Sufi 2009). Banks, on the other hand, use these facilities to produce private information that enables them to refine the contract terms offered to the borrower (Berger and Udell 1995), which can alleviate financial constraints and increase credit availability (Zhao 2021). In addition, Jordan is a bank-based economy and lines of credit are the main lending vehicle (Tayem 2022). Therefore, this study hypothesizes that firms with lines of credit rely less on internally generated cash flows, hence their investment to cash flow sensitivity will be weaker compared to their counterparts without lines of credit. The third hypothesis of this study states:

H3. *Firms with lines of credit have smaller investment-cash flow sensitivities compared to the ones without lines of credit.*

However, H3 does not consider the impact of shrinking bank debt supply on investment-cash flow sensitivity for firms reliant on bank debt. Previous research shows that banks in countries affected by the financial crisis of 2008 faced deteriorating balance sheets, hence they reduced the amount of credit supplied, which increased its cost (Zubair et al. 2020). Research also shows that due to the reduction of bank credit supply, firms dependent on bank debt reduced their investment (Campello et al. 2011) and employment (Chodorow-Reich 2014). This is because these firms were not able to compensate for the credit shortages by switching to other sources of external funding (Cingano et al. 2016; Iyer et al. 2014). This study proposes that firms reliant on bank debt (firms with lines of credit) should not exhibit differential investment cash flow sensitivity across economic conditions if the financial sector is not affected by these conditions. However, if the banking sector responds to weaknesses in the real sector by tightening credit to the real sector and supplying it at higher costs, firms with lines of credit are likely to reduce their dependence on external finance during the declining conditions (Zubair et al. 2020). This, in turn, leads to increased reliance on internal resources for firms with lines of credit in episodes of declining economic conditions to compensate for credit shortages. Hence, this study expects that firms with lines of credit will exhibit differential investment-cash flow sensitivity in the two economic conditions, with greater sensitivity during the declining conditions period. The fourth hypothesis of this study states:

H4. *Firms reliant on bank debt (firms with lines of credit) have larger investment-cash flow sensitivities in episodes of declining economic conditions.*

3.2. Model, Variables and Empirical Procedure

This study employs the framework of Tobin's (1969) *q* where firm investment is a function of forward-expected profits expressed in terms of market valuation. Stock prices serve as a useful signal that aids insiders in mobilizing capital toward the most value-adding investment opportunities (Dessaint et al. 2019; Edmans et al. 2017). Under this theory, *q* is defined as the marginal increase in market value due to the increase of one unit of capital. However, since marginal *q* is not observed, Hayashi (1982) shows that under certain assumptions average Q can be used as a proxy of marginal *q*, where average Q is the current market value of the firm divided by the replacement cost of the firm's capital.

However, the empirical evidence shows that Q alone fails to fully explain the behaviour of a firm's investment. One main shortcoming of the classical Tobin's *q* and its average Q extension theory of investment is that it assumes perfect capital markets where firms have ready and costless access to external financing and therefore finance is irrelevant to firm investment decisions. Fazzari et al. (1988) build on the work of Myers and Majluf (1984) and show that once market frictions are introduced, external financing becomes costlier than internal financing, resulting in firms passing up profitable investment opportunities that are becoming unprofitable due to those frictions. Therefore, they suggest that the investment model should contain internally generated funds expressed in terms of firm cash flow, as a firm investment is expected to be sensitive to those funds, especially if firms face financial constraints. Therefore, this study includes firms' cash flows to capture firms' reliance on internal funds (Fazzari et al. 1988; Hoshi et al. 1991). In addition, empirical studies document evidence that a firm's financial leverage determines in part its investment through the channel of underinvestment problem (Bikas and Glinskytė 2021; Chiu et al. 2022; Lewellen and Lewellen 2016). The model also includes a cash ratio, as previous evidence indicates that liquidity affects investment positively (Bucă and Vermeulen 2017; Campello et al. 2010, 2011). Finally, the model includes an indicator variable to capture the impact of the deteriorating economic conditions (Guizani and Ajmi 2020). The final model of this study is specified as follows:

$$I_{it}/K_{it-1} = \beta_1 Q_{it} + \beta_2 CashFlow_{it} + \beta_3 DebtRatio_{it-1} + \beta_4 CashRatio_{it-1} + \beta_5 2008\text{-}Indicator + \varepsilon_{it} \qquad (1)$$

where (I/K) is firm investment and is measured by the change in net fixed assets plus depreciation divided by the beginning period total capital. Since the focus of this study is on firm capital expenditures, the variable (I/K) is coded zero in case the change in net fixed assets is nonpositive. *Q* is the average *Q* and is measured by the market to book value (MBV) which is the sum of the market value of a firm's equity and the book value of its liabilities divided by the book value of a firm's assets. *CashFlow* is defined as earnings before interest, taxes and depreciation divided by total assets to capture credit constraints faced by firms. *DebtRatio* is equal to total debt over total assets and *CashRatio* is equal to cash over total assets. *2008-Indicator* is an indicator variable that equals one if the year is post-2008 and zero otherwise.

To test H1, the study estimates Equation (1) and expects β5 to be negative and significant. To test H2, the study estimates two specifications for the pre- and post-2008 periods (without including the *2008-Indicator*) and expects β_2 to be larger in the post-2008 period. In addition, the study adds an interaction term as specified in Equation (2) and expects λ to be positive and significant:

$$I_{it}/K_{it-1} = \beta_1 Q_{it} + \beta_2 CashFlow_{it} + \beta_3 DebtRatio_{it-1} + \beta_4 CashRatio_{it-1} + \beta_5 2008\text{-}Indicator \\ + \lambda 2008\text{-}Indicator \times CashFlow_{it} + \varepsilon_{it} \qquad (2)$$

Compared to estimating separate regressions for each sub-sample, the use of an interaction term has the added advantage of computing a significance level for the interaction term coefficient. To test H3, the sample is subdivided into two groups based on a priori

considerations, then the regressions are estimated separately for each group and the signs and sizes of the coefficients of the cash flow variable across the predetermined groups are compared (Ek and Wu 2018; Lewellen and Lewellen 2016). The a priori consideration of this study is access to lines of credit. In addition, the estimation includes an indicator variable, *LineCredit*, which takes the value of one if the firm has access to a line of credit and zero otherwise and it interacts this indicator variable with *CashFlow* as specified in Equation (3) and expects δ to be negative and significant:

$$I_{it}/K_{it-1} = \beta_1 Q_{it} + \beta_2 CashFlow_{it} + \beta_3 DebtRatio_{it-1} + \beta_4 CashRatio_{it-1} + \beta_6 LineCredit_{it} + \delta LineCredit_{it} \times CashFlow_{it} + \varepsilon_{it} \tag{3}$$

Finally, to test H4, the study estimates Equation (2) separately for the sample of firms with and without lines of credit and expects λ to be positive and significant only for firms with lines of credit.

3.3. Estimation Methods

Previous studies, such as Lewellen and Lewellen (2016) and Chiu et al. (2022), have employed OLS to estimate the investment equation. However, this study employs panel data; hence, there are firm-specific characteristics that are invariant over time which may not be captured by other independent variables. Therefore, this study follows Zubair et al. (2020) and applies the fixed effects model to eliminate the firm-specific effect across firms with regard to investment expenditures, which reduces the omitted variable bias. For robustness, the estimation corrects standard errors for heteroscedasticity using robust standard errors and clusters them by firm. Also, the specification uses one period lag for balance-sheet control variables, since an investment decision at time *t* is likely to be influenced by information available at the beginning of the period of balance sheet accounts (Ek and Wu 2018; Lewellen and Lewellen 2016). Using lagged explanatory variables has the added benefit of alleviating endogeneity.

4. Sample, Data and Summary Statistics

This study utilizes firm-level data of industrial companies listed on the ASE during the period 2002–2019. Financial firms are excluded from the sample because the nature of their investments is different from nonfinancial firms. Furthermore, service companies are excluded because they rely heavily on labour and have small incremental changes in their fixed assets base. Financial data used in this study is collected from the annual Companies Guide published by the ASE. The required data on lines of credit used is hand-collected from firms' annual reports. The final sample is unbalanced and consists of 1116 firm-year observations representing 81 firms.

Table 1 shows summary statistics for the sample used in the study. The median firm invests no more than 1.5% while an average firm makes new investments to total assets equal to 4%. The minimum value of the firm investment is zero, indicating that those firms do not have capital expenditures. The average firm has a mean MBV equal to 1.47, cash flow to total assets of 5.3%, debt to total assets of 15% and cash to total assets of 7.3%.

Table 2 shows the characteristics of sample firms categorized based on: (i) period, and (ii) access to a line of credit. Table 2 shows that firm investments decreased significantly post-2008. Firm cash flow also decreased significantly post-2008 while the firms' use of debt and its cash reserves were not significantly affected by the declining economic conditions post-2008. In terms of firms having a line of credit, Table 2 shows that firms with lines invest more, use more debt as a source of financing and have lower cash reserves. However, firm valuations and cash flow are not significantly different between firms with and without lines of credit.

Table 1. Summary statistics.

	Mean	**Median**	**SD**	**Min**	**Max**
Book Assets (thousand JDs)	56,400	14,700	–	320	1,220,000
Fixed Assets (thousand JDs)	15,900	4405	–	0	427,000
Firm Investments (I/K)	0.040	0.015	0.077	0	0.685
Market to Book (Q)	1.473	1.077	1.267	0.248	8.033
Cash Flow (*CashFlow*)	0.053	0.060	0.120	−0.605	0.435
Debt Ratio (*DebtRatio*)	0.150	0.105	0.165	0	0.793
Cash Ratio (*CashRatio*)	0.073	0.024	0.125	0	0.876

Table 1 reports descriptive statistics for a sample of industrial Jordanian firms listed on the ASE over the period 2002–2019. The dependent variable is I/K and is equal to the change in net fixed assets plus depreciation divided by the beginning period total capital. Q is measured by the MBV ratio. *CashFlow* is the ratio of EBITD to total assets. *DebtRatio* is the ratio of total debt to total assets. *CashRatio* is the ratio of cash to total assets.

Table 2. Firm characteristics across period and by access to a line of credit.

	I/K	*Q*	*CashFlow*	*DebtRatio*	*CashRatio*
			Pre-2008		
Mean	0.054	1.671	0.078	0.144	0.075
Observations	416				
			Post-2008		
Mean	0.032	1.355	0.038	0.154	0.071
Observations	700				
t-stat	4.646 ***	4.049 ***	5.489 ***	−1.025	0.439
			Without a Line of Credit		
Mean	0.034	1.537	0.055	0.079	0.111
Observations	453				
			With a Line of Credit		
Mean	0.044	1.429	0.051	0.199	0.046
Observations	663				
t-stat	−2.013 **	1.392	0.559	−12.853 ***	8.848 ***

Table 2 reports the means of study variables based on period (pre- and post-2008) and access to a line of credit (with and without) and shows the results of the *t*-test difference in means. The sample consists of industrial Jordanian firms listed on the ASE over the period 2002–2019. The dependent variable is I/K and is equal to the change in net fixed assets plus depreciation divided by the beginning period total capital. Q is measured by the MBV ratio. *CashFlow* is the ratio of EBITD to total assets. *DebtRatio* is the ratio of total debt to total assets. *CashRatio* is the ratio of cash to total assets. ***, ** indicate significance at the 1% and 5%, respectively.

5. Results

5.1. Investment-Cash Flow Sensitivity and Declining Economic Conditions

The analysis starts by estimating Equation (1) and reports the results in Table 3. In Column (1), the regression represents the base model by employing the full sample over the full period but without including the *2008-Indicator*. The results show that Q is positively related to firm investment, but the relationship is insignificant except for the estimation reported in Column (5). Hence, there is weak evidence that Jordanian firms respond to signals from the capital market by adjusting their capital expenditures. *CashFlow* is positively and significantly related to firm investment at the 5% significance level. This result indicates that the investment policy of Jordanian firms is sensitive to internally generated funds, which suggests that external financing in Jordan is costly or unavailable. *DebtRatio* is negatively and significantly related to firm investment at the 5% significance level. This result suggests that Jordanian firms face an underinvestment problem, as levered firms are likely to pass profitable new investment opportunities. Finally, *CashRatio* is insignificantly related to firm investments which suggests that a firm's liquidity does not influence its investment behaviuor.

Table 3. Investment-cash flow sensitivity and declining economic conditions.

	(1)	(2)	(3) Pre-2008	(4) Post-2008	(5) Interaction Analysis
Q	0.0038	0.0029	0.0050	0.0021	0.0043 *
	(1.61)	(1.21)	(0.90)	(0.75)	(1.76)
CashFlow	0.0515 **	0.0257	−0.0691	0.0474 *	−0.0598
	(2.24)	(1.09)	(−1.15)	(1.88)	(−1.47)
DebtRatio	−0.0437 **	−0.0341	−0.0163	−0.0170	−0.0332
	(−2.04)	(−1.60)	(−0.31)	(−0.67)	(−1.56)
CashRatio	−0.0126	−0.0085	−0.0137	−0.0124	−0.0094
	(−0.41)	(−0.28)	(−0.21)	(−0.33)	(−0.31)
2008-Indicator	–	−0.0217 ***	–	–	−0.0300 ***
	–	(−4.28)	–	–	(−5.00)
CashFlow × *2008-Indicator*	–	–	–	–	0.1200 ***
	–	–	–	–	(2.58)
Observations	1116	1116	416	700	1116
F-test	2.29 ***	2.34 ***	2.65 ***	1.67 ***	2.44 ***
Within R^2	0.012	0.029	0.006	0.007	0.035

Table 3 reports the regression results for the full sample and pre- and post-2008. The sample consists of industrial Jordanian firms listed on the ASE over the period 2002–2019. The dependent variable is I/K and is equal to the change in net fixed assets plus depreciation divided by the beginning period total capital. Q is measured by the MBV ratio. *CashFlow* is the ratio of EBITD to total assets. *DebtRatio* is the ratio of total debt to total assets. *CashRatio* is the ratio of cash to total assets. ***, **, * indicate significance at the 1%, 5% and 10%, respectively.

To test H1, the study estimates Equation (1) with the *2008-Indicator* and reports the results in Column (2). The findings indicate that the *2008-Indicator* is negatively and significantly related to I/K at the 1% level. This finding supports H1 and indicates that investments by industrial Jordanian firms decreased significantly in episodes of declining economic conditions. This result suggest that Jordanian firms reduce their current investment spending as uncertainty increases which is consistent with the assumption that because capital investments are costly and irreversible, the higher the degree of uncertainty, the larger the value of the option of waiting for uncertainty to resolve (Gulen and Ion 2016; Wang et al. 2014). To test H2, the study estimates several specifications and reports the results in Columns (3) to (5). Column (3) reports the regression results for the pre-2008 period while Column (4) reports the results for the post-2008 period. The results show that the variable *CashFlow* is positive in both specifications but is only significant in the post-2008 period. This result supports H2 and indicates that the sensitivity of investment-cash flow increased post-2008. To test the statistical significance of the difference between *CashFlow* pre- and post-2008, the study estimates Equation (2) and reports the results in Column (5). The findings show that the interaction term is positive and significant at the 1% level. This finding supports H2 and suggests that firm's reliance on internally generated cash flow has significantly increased post-2008.

5.2. Investment-Cash Flow Sensitivity and Access to a Line of Credit

To test H3, the study estimates several specifications and reports the results in Table 4. Column (1) reports the regression results for firms without lines of credit while Column (2) reports the results for firms with lines of credit. The results show that the variable *CashFlow* is positive in both specifications but is only significant for firms without lines of credit. To test the statistical significance of the difference in *CashFlow* between firms with and without lines of credit, the study estimates Equation (3) and reports the results in Column (3). The findings show that the interaction term is insignificant. The latter result indicates that lines of credit do not exert a significant impact on the interrelationship between firm cash flow and investments. To examine if the impact of lines of credit on the investment-cash flow relationship has changed pre- and post-2008, the study runs another two regressions with the same specification in Equation (3), but for the pre-2008 period (the results are reported in Column 4) and the post-2008 period (the results are reported in Column 5). The findings

show that the interaction term is negative and significant at the 10% level for the pre-2008 period. The results indicate that the firms with lines of credit did have a significantly lower investment-cash flow sensitivity only in the pre-2008 period. This evidence suggests that firms reliant on bank financing resorted to internally generated cash flows in episodes of declining conditions.

Table 4. Investment-cash flow sensitivity and firms with and without lines of credit.

	(1) Without a Line of Credit	(2) With a Line of Credit	(3) Interaction Analysis	(4) Pre-2008	(5) Post-2008
Q	0.0048	0.0039	0.0038	0.0051	0.0024
	(1.40)	(1.10)	(1.60)	(0.93)	(0.83)
CashFlow	0.0549 **	0.0532	0.0479	0.0180	0.0376
	(2.02)	(1.40)	(1.56)	(0.22)	(1.22)
DebtRatio	0.0189	−0.0796 **	−0.0458 **	−0.0101	−0.0180
	(0.53)	(−2.56)	(−2.10)	(−0.19)	(−0.69)
CashRatio	−0.0126	0.0477	−0.0099	−0.0310	−0.0114
	(−0.36)	(0.82)	(−0.32)	(−0.47)	(−0.31)
LineCredit	–	–	0.0027	−0.0050	−0.0001
	–	–	(0.40)	(−0.31)	(−0.01)
CashFlow × *LineCredit*	–	–	0.0075	−0.1563 *	0.0229
	–	–	(0.19)	(−1.67)	(0.56)
Observations	453	663	1116	416	700
F-test	3.31 ***	1.66 ***	2.25 ***	2.67 ***	1.67 ***
Within R^2	0.014	0.022	0.012	0.017	0.007

Table 4 reports the regression results for sub-samples of firms with and without lines of credit. The sample consists of industrial Jordanian firms listed on the ASE over the period 2002–2019. The dependent variable is I/K and is equal to the change in net fixed assets plus depreciation divided by the beginning period total capital. *Q* is measured by the MBV ratio. *CashFlow* is the ratio of EBITD to total assets. *DebtRatio* is the ratio of total debt to total assets. *CashRatio* is the ratio of cash to total assets. ***, **, * indicate significance at the 1%, 5% and 10%, respectively.

5.3. Investment-Cash Flow Sensitivity and Access to a Line of Credit

To test H4, the study examines the behaviour of the same firm group (firms with and without lines of credit) across periods (pre- and post-2008) by estimating Equation (2) for each firm group separately. The results are reported in Table 5 and show that the interaction term between the declining condition period indicator variable and cash flow (*2008-Indicator* × *CashFlow*) is positive but is only statistically significant for firms with lines of credit. This finding suggests that firms with lines of credit became compelled to use more of their internally generated funds for new investments in episodes of declining economic conditions; hence, their investment-cash flow sensitivity increased significantly.

Table 5. Regression results for firms with and without lines of credit pre- and post-2008.

	(1) Without a Line of Credit	(2) With a Line of Credit
Q	0.0046	0.0053
	(1.34)	(1.44)
CashFlow	0.0218	−0.1250 **
	(0.41)	(−2.02)
DebtRatio	0.0298	−0.0574 *
	(0.83)	(−1.86)
CashRatio	−0.0117	0.0470
	(−0.33)	(0.82)

Table 5. *Cont.*

	(1) Without a Line of Credit	(2) With a Line of Credit
2008-Indicator	−0.0170 **	−0.0433 ***
	(−2.06)	(−4.87)
CashFlow × *2008-Indicator*	0.0288	0.2118 ***
	(0.48)	(2.87)
Observations	453	663
F-test	3.35 ***	1.83 ***
Within R^2	0.026	0.060

Table 5 reports the regression results for sub-samples of firms with and without lines of credit pre -and post-2008. The sample consists of industrial Jordanian firms listed on the ASE over the period 2002–2019. The dependent variable is I/K and is equal to the change in net fixed assets plus depreciation divided by the beginning period total capital. Q is measured by the MBV ratio. *CashFlow* is the ratio of EBITD to total assets. *DebtRatio* is the ratio of total debt to total assets. *CashRatio* is the ratio of cash to total assets. ***, **, * indicate significance at the 1%, 5% and 10%, respectively.

6. Discussion

This article documents several findings that are relevant to Jordan and other countries in the MENA region. The first indicates that declining economic conditions have a negative and significant impact on corporate investments, which supports the view that firms value the "wait and see" option in face of economic uncertainty. This finding is consistent with previous evidence that shows that economic policy uncertainty in the US (Gulen and Ion 2016), China (Wang et al. 2014), Japan (Morikawa 2016), Australia (Chen et al. 2020) and India (Gupta et al. 2022) has a negative impact on firm investment. This finding is also consistent with previous evidence on the negative impact of economic shocks of financial nature on firm investment (Masuda 2015; Tang et al. 2022). The second finding of this study indicates that investment-cash flow sensitivity becomes larger in declining economic conditions which supports the view that external financing becomes less available in times of declining economic conditions which causes firms to resort to internal sources of finance. This finding supports the results of Guizani and Ajmi (2020) and Gupta et al. (2022) which show that investment-cash flow sensitivity becomes stronger during a crisis period.

The last two findings show that: (i) firms with access to a line of credit have significantly lower investment-cash flow sensitivity, compared to firms without this access, but only in the period prior to the decline in market conditions, and (ii) firms with access to a line of credit exhibit differential investment-cash flow sensitivity, with significantly larger sensitivity during the period of declining conditions. These findings are consistent with the view that, in economic decline, the supply of finance to businesses decreases; hence, firms dependent on lines of credit will be subject to larger adverse shocks due to shortages in the supply of funds (Bucă and Vermeulen 2017). For example, studies on the financial crisis show that firms with liquid assets did not exhibit a significant decline in their investments, while bank-dependent firms relied more on their internal resources of funds (Bucă and Vermeulen 2017; Campello et al. 2011). These last two findings are likely driven by the shift in the Jordanian banking sector's loan portfolio. Post-2008, banks in Jordan have exhibited healthy balance sheets, however, the Jordanian economy has suffered stagnant economic conditions caused by consecutive events, including the global recession, post the 2008 financial crisis, the Arab Spring, and other events and policies (see Section 2). Consequently, banks in Jordan have altered their portfolio structures towards more profitable segments, such as the consumer and government segments, instead of the business segment. In addition, the Central Bank of Jordan has, in an effort to curb inflation, followed a contractionary monetary policy post the 2008 period, which was reflected in an increase in base interest rates. This led to a reduction of the supply of bank credit to businesses and an increase in its cost. Therefore, firms dependent on credit from these banks (measured by having access to a line-of-credit facility) responded to the tightening of credit conditions by relying more on internally generated funds. This has caused a

significant increase in the investment-cash flow sensitivities post-2008 for firms with lines of credit.

Based on these findings, this study draws several implications that can be generalized for other small and developing markets. Policymakers are advised to take measures that reduce the uncertainty associated with declining economic conditions to encourage businesses to take new investments. Although part of the uncertainty relates to factors beyond the control of policymakers, such as the global credit crisis and the Arab Spring, other parts of the uncertainty relating to monetary and fiscal policies can be managed by policymakers. Therefore, policymakers are advised to maintain transparency, continuity, and stability of macroeconomic policies. In addition, policymakers are encouraged to examine the incentives of the banking sector to supply funds to businesses, especially in times of declining conditions, and to take measures accordingly. The shortage of external finance, which led firms with lines of credit to resort to internal funding, was caused mainly by a shift in banks' portfolio composition, not by weaknesses in banks' balance sheets. Monetary policy tools are effective in influencing the composition of bank portfolios and the supply of credit to businesses. In addition, the findings of this study can be of interest to managers and investors who should consider the impact of financial structure on their demand for productive capital input. Also, future research can extend this work by investigating the impact of monetary policy, exploring the experiences of other countries and regions, and examining the role of supply factors that are independent of financial crises on exuberating (alleviating) firm financial constraints.

7. Conclusions

This study examines the impact of declining economic conditions and access to lines of credit on firm investment behaviour using a sample from Jordanian industrial listed firms over the period 2002 to 2019. In terms of economic conditions, the results show that firm investments are negatively affected by declining economic conditions and that investment-cash flow sensitivity has increased post the 2008 period (which marks the declining economic conditions period). This result suggests that external financing became less available and/or costlier; hence, investment-cash flow sensitivity became larger. In terms of lines of credit, a proxy of a firm's reliance on bank debt, the results indicate that firms with and without lines of credit have not exhibited differential investment-cash flow sensitivity post the 2008 period. In addition, the results show that firms with lines of credit exhibit higher investment-cash flow sensitivity in episodes of declining economic conditions. These findings are reflective of the Jordanian banking sector's policies post-2008. The Central Bank of Jordan followed a contractionary monetary policy post the 2008 period, which led to an increase in base interest, and banks then shifted their loan portfolio away from the business sector and more towards other market segments, including government and consumer debt. This led to the reduction of the supply of bank credit to businesses and an increase in its cost. Therefore, firms dependent on credit from these banks (measured by having access to a line of credit facility) responded to the tightening of credit conditions by relying more on internally generated funds. The findings of this study contribute to our understanding of the impact of declining economic conditions on firm investment by using a new context which represents MENA countries. They also contribute to our understanding of the adverse impact of worsening financial conditions on imposing further financial constraints on businesses by examining the case of a small developing country with a bank-based economy under which bank credit was tightened because of changes in banks' loan portfolio choices, not because of problems relating to the health of their balance sheets.

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